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REPORT ON

END-USER AND DEPARTMENTAL COMPUTING

An AMA Research Report
with the cooperation of

The Microcomputer Managers Association

AMACOM Briefings & Surveys

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Introduction

Departmental Computing and the Organization

by Dr. Gerald M. Hoffman

THE DATA presented in this report make it abundantly clear that end-user computing is a significant and growing part of the information systems activities in most organizations. Information centers (ICs)—organizational entities whose purpose is to help end users do their own computing—have experienced substantial success.

As a result, they will be around for a long time. Fifty-four percent of the organizations surveyed have ICs, and less than 3 percent plan to discontinue them. About 22 percent of the organizations not already having ICs (46 percent of the sample) plan to form them during the next two years. End-user computing will continue to grow. At some point it will become so large in cost and/or so pervasive in applications (for example, a warehouse with its own inventory control system) that it will require thoughtful managerial attention. It will also acquire its own name: departmental computing.

Among the most significant managerial questions raised by the growth of departmental computing are:

- Given that a significant amount of computing is being done within a user department—that is, any department other than the information systems department (ISD)—how is that activity being managed and how should it be managed?
- As departmental computing grows, what will the effect be on the traditional ISD?
- With many user departments in an organization doing much of their own computing,

how can the total computer effort of the company be orchestrated to provide maximum benefit to the organization as a whole?

MANAGING DEPARTMENTAL COMPUTING

There is a great deal of end-user computing going on, and the trend is upward. User departments have sole responsibility for computing in a wide variety of applications. The report shows that 43 percent of the companies feature at least one user department with sole responsibility for its own budgeting and financial management applications. Other applications with substantial user control include: departmental report writing—39 percent of the companies; project management—46 percent; and word processing—60 percent. Presentation graphics, list processing, and computer-aided design are other areas where a significant number of users have control.

In the traditional world of information systems, user departments are responsible for working with the ISD to determine needs and functional specifications of new systems. In some cases users operate their own information systems, in the senses of entering data, initiating runs, and causing reports to be printed.

If "departmental computing" is to mean anything at all, it must mean that the user department does something more. The user department must assume primary managerial responsibility for successfully overseeing at least some of the computing and information systems required to operate and manage the department. Thus departmental management must deal with all the issues with which ISD management deals, albeit on a smaller scale. These include personnel selection and management, hardware and software selection, choice of operations to automate, functional- and technical-requirements definition, acquisition of application systems by purchase or internal development, systems operations, maintenance of hardware and software, disaster backup and recovery, and so forth.

Many user departments have the authority to do everything necessary to build and operate applications systems. In 11 percent of the companies surveyed, users can authorize purchase of mini or mainframe hardware; and in 24 percent of the companies, they can authorize the purchase of mini- or mainframe software. Users have similar authority with respect to micro hardware in 50 percent of the companies, and micro software in 57 percent. Users can purchase training, hire outside consultants to build customized systems, and authorize access to corporate databases in 20 to 30 percent of the companies.

This is not to say that user department personnel must actually do all these things; rather, departmental management must see to it that they are done. One of the strategies that has been widely adopted is for user departments to develop and run applications, while the ISD provides most of the needed technical support. Although as noted above, users have a great deal of purchase authority, the ISD is identified as the "key player" in systems purchasing decisions in over 50 percent of the companies surveyed.

However, ultimate responsibility—including responsibility for significant technical judgments—rests with the user department. And that department is seldom equipped to exercise this responsibility properly. In only 16 percent of the companies surveyed do users have any professional information systems specialists on their staffs. (One could argue that regular department personnel can learn the necessary information systems skills; but then who is to do the regular tasks of these people?)

This is a situation fraught with peril. Departmental managers may not know, for instance, that they should be concerned about hardware failure or that "disaster recovery planning" can help them mitigate the effects of such failure. The organization must then either proceed without this protection or pay the cost of inventing it all over again.

The problem is not insurmountable. Its solution requires (1) recognizing that departmental computing must be managed and that this requires time and resources, and (2) changing the role of the ISD to support the new reality of departmental computing.

EFFECTS ON THE INFORMATION SYSTEMS DEPARTMENT

Departmental computing has changed the world of the traditional information systems department. The ISD monopoly of computing capability is gone. Others who are not in the ISD are in control; and they are usually not even information systems professionals! All of the bitterly learned lessons of systems building and management seem destined to be lost. The hard-won consistency, compatibility, and connectivity of corporate systems is being eroded to the point of chaos. At the same time, organizations are growing increasingly dependent on information systems not only for administrative support, but for support of operations that are essential to their very existence.

This report shows that all is not lost. The ISD is generally redefining its role from provider of *all* information services to provider of a *framework* within which applications can be built and operated, either by the ISD or by users. This means providing computer and communications systems for the organization as a whole, making corporate data available as appropriate throughout the company, and educating end users in the proper use of these facilities.

ISD remains largely in control of major corporate computer and communications systems. In more than 50 percent of the companies surveyed, the ISD controls telecommunications links with other sites within the organization and with suppliers and customers. In 77 percent of the companies, the ISD must authorize physical links between micros and mainframes; and in 76 percent of the companies, it controls access to corporate data.

The information center is essentially a response of the ISD to the emergence of departmental computing. As noted above, more than 50 percent of the companies surveyed already have ICs, and more are planning to create them. Typically an IC's stated goals are (1) to teach end users what they need to know about computing so that they can do it themselves and (2) to help them do it. The hope is to decrease the legendary two-year backlog for new applications development. Although ICs have succeeded in teaching and helping the users, the backlog remains.

In addition to running the IC as a training center, ISDs have general organizational responsibility for computer training in 68 percent of the companies surveyed. This gives them major long-term influence over the direction of computing activities.

The boundaries between departmental computing and ISD computing are not yet clearly drawn, but certain trends are becoming evident. The infrastructure for computing and telecommunications will be provided by the ISD. This includes mainframe computing; the telecommunications network; and standards for system acquisition, development, and operations.

The large transaction-oriented applications systems—the systems that operate the enterprise—will continue to be built and operated by the ISD. These systems almost always cross departmental boundaries and so find no natural home within any one department. Furthermore, they typically require such a high degree of efficiency and technical sophistication that nonspecialists are simply unable to build and operate them.

Some user departments will build and operate their own intradepartmental systems, while others will rely on the ISD as before. In the end, the choice between departmental computing and ISD computing will be made by the user departments, often based on considerations quite apart from the computing activity itself. These include departmental workload, market conditions, and so forth. Furthermore, the development and operation of these systems will be in a constant state of flux; sometimes they will be the responsibility of the user department, and sometimes the responsibility of the ISD. Already there are reports of user departments becoming disenchanted with being in the information systems business and turning their intradepartmental systems over to the ISD to maintain and operate.

The effect of all of this is to leave the ISD with the more technically difficult tasks, while the user departments take over the smaller and easier jobs. The challenge to the ISD's management is to maintain the technical proficiency and morale of the ISD during a time when its size *is* decreasing and its responsibilities *seem* to be.

DEPARTMENTAL COMPUTING AND THE ORGANIZATION AS A WHOLE

The advent of departmental computing creates a new problem for the organization as a whole: no longer is any single entity responsible for all the computing activities in the enterprise. There is a real danger that while each department may be doing its own computing tasks well, the enterprise as a whole may suffer from lack of coordination and missed opportunities.

In some organizations where information systems are or may become strategically important, a new senior executive position has been established to deal with this problem. It's dubbed chief information officer (CIO) by the trade press, although few incumbents officially have that title. Regardless of the title, the job is to marshall the company's information resources to support its strategic and operational goals.

To do his or her job the CIO needs three things. First, the CIO must be a member of the senior management; a first-hand knowledge of the opportunities and constraints confronting the enterprise is required, as well as the strategies developed to deal with these. Second, the CIO must understand information technology well enough to know when it can provide useful support for corporate strategy. Third, the CIO must have the corporate resources to guide the company's computing efforts in the right direction.

The new ISD that is evolving in response to increasing departmental computing is the ideal vehicle by which the CIO can exercise leadership and control of the computing function throughout the enterprise. This arrangement will also avoid burdening operating departments with excessive bureaucracy and constraints. By controlling the computing and telecommunications networks and the standards associated with them, the CIO can assure the required level of compatibility and connectivity without stifling departmental creativity. And by directly supervising a core of high-level applications development expertise, the CIO can assure the availability of resources to build and operate corporatewide systems of strategic importance.

" 'Tis a consumation devoutly to be wished."

1

A Decade of Transition

Exactly what is departmental computing right now? Is it anything outside of MIS, anything that does not require an air-conditioned room? I think that the dynamic nature of end-user or departmental computing is equivalent to what MIS was 5 or 10 years ago. You have all of the power right there.

THE ORGANIZATION that 9 years ago decided to supplement and then replace typewriters with word processors achieved, and perhaps still retains, a competitive advantage in the 1980s. The company that 5 years ago insisted that its departmental managers learn to manipulate computerized spreadsheets gained and continues to hold a similar advantage.

In these cases, and in others, business departments took responsibility for computerizing a task and managing the new technology the task required. And in such cases, the senior or departmental manager—often with the aid and assistance of the MIS department, but frequently without it—planned, organized, and controlled the changeover. The expenditures, the decisions about allocation and priorities, and sometimes the evaluation of necessary hardware and software, were all departmental. Without ever hearing the phrase, business managers found themselves in charge of an *end-user* department, encouraging and funding the rise of *end-user* computing.

Since 1984, the American Management Association has reported to its membership on this phenomenon. Initially, with publications in 1985 and 1986, AMA research focused on the "information center"—the unit designed to serve as a bridge between end users and centralized data processing operations. But end-user and departmental computing has crossed that bridge—or braved the currents—without ever building one. In 9 out of 10 companies surveyed for this study, significant computer tasks have been turned over to individual departments for data input, configuration, and printout.

What tasks? What hardware? What software? At what cost? Requiring what types of training? With what results? Those are the questions we set out to answer.

We surveyed working MIS managers at 295 organizations, compiling data gleaned from an extensive eight-page questionnaire. And with the data in hand, we asked for expert commentary from Dr. Gerald R. Hoffman, whose introduction begins this report; from Jerry Koret of DataEase International, whose essay on the "buy cycle" appears in Chapter 2; and from Richard C. Anderson, Jr., of Mead Data Central, Inc., whose advice on training and cost controls for on-line databases ends Chapter 2.

Finally, we organized four separate roundtable discussions with directors and members of the Microcomputer Managers Association, a New York-based organization of some 500 micro managers. At each two-hour session, we reviewed sections of the data with eight eminently qualified practitioners. To assure the free flow of discussion, we promised to quote participants on a not-for-attribution basis. The quotation that opens this chapter comes from these discussions, and throughout the report we have printed selected commentary that is appropriate to the particular topic under review.

The agendas for the four panel discussions:

- *Managing End-User Computing:* Costs and cost controls; justifications and productivity measures; hardware and software evaluations; purchasing, the vendor-buyer interface, and the "buy cycle."
- *End-User Profiles:* departmental applications; centralized vs. decentralized processing; and MIS management.
- *The Information Center:* staffing, budgets, responsibilities, and services provided.
- *Training:* Tools, methods, and providers; organizational responsibility; costs; measuring effectiveness.

Readers should bear in mind that the Microcomputer Managers Association (MMA) draws its membership largely (but not exclusively) from large organizations that deal in financial services. This predisposition naturally gives the discussions a particular bent. However, these are exactly the companies that have been the first to empower end users with computing tools. Therefore, most of the discussion participants have already met and managed the problems that other organizations are just beginning to face. Their commentary, drawn from working experience, may serve as a guide to all.

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HOW TO READ THE FIGURES

Readers should review the data in this report and the charts in the appendix with these points in mind:

- The AMA questionnaire asked respondents to answer the questions in terms of their own worksites. *If, for example, you work with a division or subsidiary of a larger firm, or at one worksite among many in the organization,* the questionnaire read, *please answer the questions on the basis of what you know about your division, subsidiary, or worksite, rather than what you know about other parts of your organization.*

  Thus, the figures for dollars spent on hardware and software apply to the *particular respondent worksite*. For instance, the data informs us that the average projected budget for 1989 expenditures on mainframe hardware totals $321,000. *This should not be read as the average budget for mainframe technology for the entire organization.* It represents the average budget for the respondent worksite *only*. Moreover, it represents only those mainframe expenditures *in support of departmental and/or end-user computing*. It does *not* encompass budgets for centralized processing under the direct control of the MIS function.
- The figures for the number of pcs, linked pcs, and mainframe/minicomputer terminals, and for the number of end users with access to them, should likewise be read in terms of the respondent worksite only.
- Similarly, the data regarding purchase authorizations, "key players" in buy decisions, departmental responsibilities for specific computing tasks, and other policy matters all reflect the practices at the particular respondent worksite. Obviously, large and midsized organizations may have different rules at different worksites.

  For that reason, and as an aid to reading the data correctly, the charts in the appendix break out the figures by "worksite description"—that is, corporate headquarters; division, subsidiary, or branch of a larger organization; or organizations with all major units (except sales and service offices) in a single location. The latter category encompasses most small companies, which represent 54.2 percent of the AMA sample.

- We define corporate size in terms of annual sales or, for nonprofit organizations, annual operating budgets. A "small" company is one with less than $100 million in annual sales; a "midsized" firm, one with $100 million to $500 million in annual sales; a "large" company, one with more than $500 million in annual sales.

But because respondents answered in terms of their immediate worksites, the charts in the appendix also break out the figures by worksite population, and many of the figures in the text do likewise. In this as in past AMA reports, we find that policies and procedures in end-user computing are more often a function of the worksite population than the organization's overall size.

The 295 respondents present this profile:

	All	*Small*	*Midsized*	*Large*	*Not Reported*
Whole Sample	295	160	64	51	20
Manufacturing	100	55	25	18	2
Service	119	70	25	23	1
Others	46	25	12	5	4
Not Reported	30	10	2	5	13

Further information on the AMA sample, including breakouts by the repondents' primary products and/or services, will be found in the appendix.

A statistical sample of 295 contains a margin of error of 5.8 percent. The subsets—by organizational size, by business category, and by worksite population—have a larger margin of error, up to 13.9 percent for sets of 50. Readers may be assured of the statistical validity of data from the whole sample; for the smaller subsets, the figures should be read as a guide rather than a rule.

THE MAJOR FINDINGS: A SUMMARY

To the questions posed above—What tasks? What hardware? What software? At what cost? Requiring what types of training? With what results?—the data and the expert commentary provided these answers:

Tasks. Nine out of 10 respondents have turned over major computing functions to business departments for data input, configuration, and printout—the very definition of end-user and departmental computing.

Chief among these tasks is word processing, an exclusively departmental responsibility at 61 percent of respondent worksites, and one shared with the MIS function at an additional 20 percent. Closely following: departmental budgeting and financial management (a departmental task at 44 percent of respondent worksites, and shared at 30 percent); project management (department, 46 percent; shared, 21 percent); and report writing (department, 41 percent; shared, 28 percent).

Tasks involving automated links with other corporate worksites, or with customers and suppliers, remain the responsibility of the MIS function at a majority of worksites. Training remains an MIS responsibility for 43 percent of the sample, a shared one at 28 percent.

Manufacturers have put computer-aided design and manufacture (CAD/CAM) into the hands of the manufacturing division at 44 percent of respondent manufacturers; the task is shared with MIS at an additional 16 percent.

For additional data, see Figure 2-1 in Chapter 2.

Authority. With departmental responsibility comes the authority to purchase end-user tools, to develop training modules, to sign outside consultants for special applications development, and to provide end users with access to corporate data or to on-line databases. Department heads become the "key players" in purchase decisions—that is, the signature that carries most weight among many who must sign onto a purchase.

The move to departmental computing notwithstanding, the MIS function retains major authority in purchase decisions at most worksites. Nearly 80 percent of respondent companies identify MIS as the "key player" in purchases of mainframe hardware and software in support of end-user and departmental computing.

MIS authority diminishes, and departmental authority increases, in the purchase of microcomputer hardware and software for end users. For micro hardware purchases, MIS is the "key player" at 54 percent of respondent worksites, the end-user department at 20 percent; for micro software, the figures are MIS: 47 percent; end-user department: 26 percent. A similar shift occurs in necessary authorizations for purchases—that is, who must sign onto various purchases, without regard to the "key player" issue.

End-user departmental authority shows a similar increase in purchasing training tools or signing agreements with providers and in contracting with outside consultants to create special applications software for departmental use.

For further discussion, see Chapter 2; for additional data, see Charts 18-23 in the appendix.

Departmental Hardware and Software. The standalone microcomputer, the original enabling tool in end-user computing, is in use in business departments at 83 percent of respondent worksites, and at 94 percent of large-company worksites. Just under 60 percent of respondents have dedicated mainframes or minicomputers in departmental service, and a third have local area networks (LANs) serving specific management groups (see Chapter 2, Figure 2-2).

But the standalone, with its limited capacity, is being linked to other micros or to departmental and corporate mainframes at an ever-increasing rate. By the end of 1988, there will be more linked pcs than standalones at worksites that use both technologies; the average number of linked pcs will nearly double at respondent worksites in 1988, whereas the average number of standalones will increase by 22 percent. Mainframe/mini terminals will increase at a rate of 15 percent. (For additional data, see Charts 3-8 in the appendix).

By the slightest of margins (91.1 percent to 90.5 percent, well within the sample's margin of error), spreadsheet software is in greater departmental use than are word processing packages. Database management software is used departmentally at 71 percent of respondent worksites, graphics software at 68 percent, project management software at 39 percent. Among manufacturers, 31 percent of the sample uses CAD/CAM software. Half of the respondent worksites provide end users with access to independent on-line databases. (See Figure 2-3 in Chapter 2.)

Costs. Spending for both hardware and software in support of end-user and departmental computing shows an important increase in communications software only. The average budget for communications software for micros will double from 1988 to 1989, whereas budgets for all other types of micro software will remain at current levels. Whereas the customer base for vendors will increase in most categories—that is, more worksites will spend monies on various computing tools in 1989 than in 1988—the average expenditure per worksite will decrease or, at best, remain at 1988 levels. Again, communications software is an exception. (See "The Outlook for Vendors" in Chapter 2; for data, see Charts 9-17 in the appendix.)

Training. End-user training budgets grew by an average of 10 percent from 1987 to 1988, and the average number of end users trained grew by 34 percent.

Computer-based training (CBT) shows the greatest growth among training tools; the number of end users trained via CBT increased by 58 percent from 1987 to 1988. Large organizations nearly doubled the number of end users trained via CBT in that time span.

The MIS function assumes or shares responsibility for end-user training at 74 percent of respondent worksites; the end-user department, at 36 percent. Among worksites that support such units, the information center assumes or shares training responsibility at 97 percent.

For discussion and complete data on training, see Chapter 4.

The Information Center. Discrete end-user assistance units are in operation at 58 percent of respondent worksites and will start up in the near future at an additional 7 percent. Seventy percent will increase their budgets in 1988 over 1987 levels, but 9 percent will operate under decreased budgets, and 10 respondents that currently operate infocenters report plans to phase them out.

Virtually all information centers assist end users in hardware and software selection; 88 percent create applications software for end users. Similar numbers evaluate end-user hardware and software prior to purchase. Virtually all have training responsibilities.

Staffing patterns shift with worksite population and with assigned tasks. Nevertheless, three-quarters of respondent infocenters have at least one full-time trainer on staff, and 41 percent have more than one trainer.

Information centers must authorize purchases of micro hardware and software at 36 percent of respondent worksites that support such units. The presence of an information center usually indicates a slight decrease in MIS authority over the purchase of end-user tools but a larger decrease in departmental authority.

For discussion and complete data on information centers, see Chapter 3.

THE "GOLD COLLAR" WORKER

The departmental worker or manager with special insight into the capabilities of information technology was dubbed the "gold collar" worker by a participant in MMA roundtable discussions. The value of such people at any level of management is undisputed; the question of how such workers are to be identified, nurtured, and trained became a focus of particular interest. The discussions are reported in the second half of Chapter 4 of this report.

The editors send their special thanks to the contributors to this report, and in particular to the 295 survey respondents who worked their way through a demanding and complex questionnaire to share their data with us and with our readers.

A DEEPER TRUTH

Five years of ongoing coverage of the field of end-user computing, with a special emphasis on its management, have brought out a particular (and perhaps delicious) irony. In the popular mind, computer technology works directly: push a button and something happens. Because of this, in large measure, departmental and senior managers expect that their *management* of computer technology should work in the same way: push an "acquisition" button, and the proper technology appears on desktops; push a "training" button, and end users acquire necessary skills.

But the deeper truth is that the management of end-user computing—like the technology, if seen in wider focus—is *evolutionary*, not automatic. The successful manager of information technology is one who does not seek a single button to push, but who instead shows patience and flexibility as needs become apparent and solutions develop. We present this report, therefore, as both a guide and a caution.

2

Into the Departments

Things don't happen unless the user is satisfied. If the user doesn't agree to it, it doesn't go.

CONNECTIVITY is king, the AMA survey announces.

While the standalone microcomputer cannot yet be termed a vanishing breed, in 1988 companies will add linked pcs and mainframe/mini terminals at a far greater rate than standalones. In fact, by year-end, end users will be served by as many linked pcs as standalones at worksites that use both technologies—an historic "first."

A clutch of survey findings underline the primacy of connectivity:

- Spending on communications software for micros will *double,* on average, from 1988 to 1989, while budgets for all other types of micro software will remain at current levels.
- The number of linked pcs at an average worksite will increase by 87.1 percent in 1988, compared with a 22.2 percent increase in the number of standalones.
- By year-end, there will be an 11 percent *increase* in the number of worksites that have linked pcs; there will be a 2 percent *decrease* in the number of worksites that have standalones, as current standalones are wired to networks or mainframes.
- Area-specific mainframes and minis now support end-user computing at 60 percent of respondent worksites, and local area networks (LANs) are in use at one-third of them.

LANS AT LAST

The long-predicted "Year of the LAN" may actually have occured in 1987. Local area networks now serve administrative departments at 18 percent of respondent worksites, financial departments at 15 percent, and sales and marketing departments at 13 percent. Two-thirds of large-company worksites have LANs in operation in at least one department outside MIS, as do 41 percent of midsized-company worksites. Forty percent of the service companies and 29 percent of the manufacturers in the AMA sample have LANs installed in business departments. (For further discussion and data on departmental technologies, see "Departmental Hardware" and "Departmental Software" below.)

Linkage is a fact of life at large-company worksites. Among these respondents, 84 percent had pcs linked to mainframes or minis, or networked with one another, as of January 1988; 86 percent will have them by December. However, the real growth is at midsized and small-company sites. The number of midsized-company worksites with linked pcs will increase by 12 percent in 1988, to 86 percent, up from 77 percent; small companies will register a 16 percent increase, to 56 percent from 48 percent:

> Our standalone units will not be standalone for long—and they are not really standalone now, in that they are linked up to our electronic mail system and also, whenever possible, to our mainframe system.

Fewer standalones, more linked pcs—and, completing the story, more terminals as well. A typical worksite will have 18 percent more terminals at the end of 1988 than it did at the beginning of the year. Again, the growth is at midsized- and small-company worksites: large firms report no increase in the average number of terminals, midsized firms predict a 32 percent increase, and small firms a 35 percent increase.

HERE, THERE, AND EVERYWHERE

Where are the end users? The answer depends on what business the respondents are in. A comparison of manufacturers and service providers shows vital differences in who gets first call on computing tools:

The End-User Community—by Business Function

Department	*Manufacturers (N=100)*	*Service Providers (N=119)*
Finance	23%	20%
Sales & Marketing	17	10
Administration	12	24
Human Resources	4	8
Manufacturing	26	3
Research & Development	9	5
Other	10	31

(Bear in mind that these figures do *not* represent the percentage of workers in each department with access to end-user tools. Rather, the figures give the percentages of the *whole* end-user community to be found in each department at the respondent worksite.)

What is evident is that the computing tools are going to the people who actually do the company's business—those who create the products or provide the services. The "others" in the service companies are the brokers, analysts, and customer service representatives who carry out the firm's core functions. Naturally, the manufacturing function has primacy in manufacturing concerns.

No such differences emerge when we examine the end-user community in terms of management level. Businesses of every stripe and size report that senior managers comprise approximately 5 percent of the end users; middle managers, 15 percent; supervisors, 15 percent; nonsupervisory end users, 40 percent; and hourly employees, 25 percent. The "nonsupervisory" level that represents the lion's share of end users are again the analysts in financial services, the copywriters in sales and marketing, the designers in R&D, and computer programmers themselves; the hourly workers are the secretaries at word processing or the keypunch operators feeding figures into the corporate database.

> Rather than look departmentally as to what technologies were required, we tried to clarify the type of computing power necessary to the end user's function. We have three types of administrative staff: what's called a manager's secretary, who does a set number of functions; partner secretaries, who do a different set of functions; and administrative staff, who support various departments. We also have two different types of professional machines. So rather than define departmentally, and say, you need this, this, and this, we try to define functionally across departments and come up with standards for that.

> We are just now seeing senior managers starting to use some of the tools, some of the applications, because of the connectivity issues. Managers are beginning to want to collect the information on the personal computer, on the local area network. They are coming to us for electronic mail.

> I've been at my organization for a year. Personal computers had already arrived, and were serving middle managers—people who were motivated on their own to go out and get them, teach themselves, and use them. When I got in, my first charge was to push pcs down to a lower level, to people who needed to be more productive and who were not using the technology. And now that we have met most of that need, or have started to meet it, we are beginning to hear that the executives want them. Their needs are all defined: they want everything super user friendly. But they are not prepared to commit the resources, so they start to back off.

> We are seeing senior managers starting to use pcs, because the senior managers now are the people who were junior accountants five or six years ago and started using computers then.

> We are really pushing the technology down. There is a tremendous move right now to cut heads. And we want to change the traditional ratio of clerical-administrative help to professional staffing, which is two-to-one. We want to reverse that. So there is going to be a corporatewide audit of pcs, headed by someone who has been known as "the white knight of sod-cutting" in the past. He is going in and looking to see if there are 5 secretaries for 12 people; I think he would like to see 2 secretaries for those people.
>
> So I am not seeing pcs pushing up as much as I am seeing them pushing down. But I am also observing a higher management involvement in the process.

> The driving force for pcs in our organization is the chairman, who decided six years ago that he wanted to have a high level of visibility for pcs within the professional group, so that we could go out to clients and say that we are on the cutting edge of technology. The goal is to have one machine for every specialist in our organization.

THE OUTLOOK FOR VENDORS, 1988 AND 1989

There's good news and bad news for vendors in AMA's survey findings. The good news is that more companies will be purchasing hardware and software for end users in 1989 than in 1988; thus the market is expanding. The bad news is that the typical respondent will spend less in most given categories in 1989 than in '88; thus the dollar-per-customer figures are headed downward. On balance, vendors can expect a 5 to 10 percent increase in overall sales.

An example: 43 percent of respondent firms have budgeted monies in 1988 for new mainframes or minis to support end-user computing at the worksite, with an average worksite expenditure of $381,000. In '89, 55 percent will buy in this category—an increase of nearly 30 percent—but the average expenditure for the worksite will be $329,000, a decline of nearly 14 percent.

The pattern holds in other categories: a 12 percent increase in those shopping for mainframe or micro terminals, but a 3 percent decrease in the per-worksite budget in '89; an 18 percent increase in the number of companies buying mainframe applications software for end users in '89, but a per-customer decrease of 14 percent in the budgeted amount.

The figures for micro expenditures tell the same story: 21 percent more customers for database management software for micros, but no change in the dollar amounts per customer; 39 percent more customers for project management software, but 12.5 percent fewer dollars per customer; a 10 percent increase in firms shopping for word processing software, but an 8 percent decrease in per-customer budgets from '88 to '89.

The vibrant exception: communications software. The number of customers shopping for such software for micros will increase in 1989 by 31 percent over 1988; and the average dollar expenditure per worksite will soar by 77 percent, from an average $13,000 per worksite in 1988 to an average $23,000 in 1989. This is the only category among micro expenditures to show an increase in dollar-per-worksite averages from '88 to '89. Connectivity reigns.

> I would say that the single most strategic application is communications. We are focusing on in-house communications, so that developers can write an application, and use the key verbs like connect, transmit, or whatever, to get close connectivity—and they can get the connections simultaneously. I would say that my group's chief goal is to make it possible for a pc to talk to any other intelligent device in the company, or anywhere in the world.

CLOSE CALLS

To centralize or decentralize: what work is best done by business departments, and what by centralized MIS units? What systems are best suited to do such work? Where can desktop micros—up to 90 percent more cost effective than mainframes in terms of "dollars per nip"—function most effectively, and with what software?

The AMA survey took the current pulse of end-user and departmental computing in respondent organizations. Findings confirm that business departments are increasingly responsible for their own computer applications, especially in large companies. The figures may serve as a useful guide for senior managers—including that rare bird, the chief information officer—who face key decisions in assigning responsibility for computer tasks.

A THREE-TIERED STRUCTURE

Such decisions depend on the application, say the MIS managers with whom we spoke. Most large and midsized firms adhere to a three-tiered structure, wherein the corporate database resides on a mainframe; transaction processing is distributed to divisions, departments, or functional units; and microcomputers serve end-user needs. But all three tiers continue to grow: one firm that has shifted 80 percent of its work off the mainframe nevertheless expands its mainframe capacity at an annual rate of 35 percent.

Microcomputing is economically efficient. One company's rule of thumb is that micro use costs 25 cents compared with a dollar of mainframe expense for the same work; another fixes the ratio at a dime of micro costs for a dollar of mainframe costs. But, according to one manager, "The more you have on your micros, the more you get on your mainframe." Most firms, he says, "are going both ways at the same time, pushing some things out (distributed processing) and bringing other things in."

But cost need not be the deciding issue when the question is whether to centralize or decentralize. One working manager put forward this guiding rule: "Push everything as close to the customer as possible, as close to the end user as possible."

Thus, in the three-tiered system defined above, questions usually center on the middle tier. What data should go onto regional processors? "It doesn't matter what specific system design you use," another manager advised. "You have to build in some flexibility, a platform that can go either way. You've got to be ready to change, year-to-year."

> There is a sense of concern. The central MIS group knows that it is going to have to manage a fairly sophisticated network that is ultimately going to come together to hook up depart-

> ments that may need connectivity to get certain data. And MIS doesn't have the time right now. Unless the situation has reached a critical mass, they do not focus on it.
>
> End users, on the other hand, have a fairly significant installed base of personal computers and minicomputers. There is value added in local networks. In some instances, LAN cost advantages exceed those of installing a minicomputer. And they are being installed. The technologies are backing into each other, you could say.

> The end users at pcs want to get access to corporate data. And they are starting to pressure central MIS for network support. So we see a shift in politics here, with some advantage now flowing back to MIS, which may now say, "If we are going to give you network access, we want certain things in exchange."

> We upped the ante on our hardware in order to have the architecture that would allow us to pass data from the mainframe. But the existing software is totally underutilized and so are the existing machines for that matter.

THE DEPARTMENTS TAKE OVER

> The tide turned when the mainframe computer department discovered that personal computers were computers—they weren't toys, they were computers. There's been a discovery process.

What changes are taking place in the wake of this discovery? AMA's findings reveal a dramatic increase in departmental responsibility for many computer functions traditionally performed by centralized MIS units.

Have any of the computing functions listed below been turned over to any single department, or more than one department, for execution? the questionnaire asked. *Is MIS responsible for the data input, configuration, and printout for these functions; have they been "departmentalized," or are they shared?*

Figure 2-1 shows the results.

With the exception of communications technology, training tasks, and data backup and security, *all* of the listed functions are assigned to end-user departments far more frequently than to centralized MIS units—and even more often than when such responsibilities are shared by MIS and end-user departments. The larger the organization, and the larger the worksite population, the more likely it is that the prime functions of budgeting, report writing, and list processing have been turned over to end-user departments. These departments input, configure, and print out the data.

> A lot of this stuff wasn't part of MIS to begin with. Budgeting, financial—every department has to do that. Report writing, project management work, graphics—usually not.

Figure 2.1. Computer functions turned over to departments for data input, configuration, and printout. (Whole sample: 295)

Function	*MIS/DP %*	*End-User Department %*	*Shared %*	*No Assigned Responsibility %*	*Not Reported %*
Department budgeting and financial management	17.3	43.7	29.8	4.1	10.5
Departmental report writing	23.1	40.7	28.1	6.8	8.5
Departmental project management	16.6	46.1	21.4	9.2	11.5
Departmental word processing	10.2	60.7	20.7	4.7	8.1
Presentation graphics	10.5	44.1	21.4	14.9	14.9
Departmental list processing	18.0	39.3	20.3	9.5	16.6
Computer-aided design and production*	13.2	29.5	12.5	20.3	27.5
Automated links with other corporate worksites	51.5	7.1	12.9	10.2	22.0
Automated links with customers/suppliers	33.9	9.5	11.9	20.0	27.1
Training	43.4	16.9	27.5	5.4	13.2
Backup and security	58.6	13.9	19.3	2.7	11.5

*Manufacturing companies only; N = 100

> Departmental responsibility is cost effective. And I think that it brings the tasks closer to the business level. The only problem I have is that I don't feel technology should be either centralized or decentralized. I really feel that there are certain tasks that are appropoiate at each level. Certainly, it's appropriate that applications development be handled at the department level, as it is that utilities should be centralized. But we should not end up with just the utilities being centralized. There are support functions, and there are planning functions, which should also be central.

The departments are by no means entirely on their own. Three out of 10 large-company respondents report that they have MIS/DP specialists on *departmental* budgets to support end-users in the departments; and nearly 4 out of 10 large firms say that their MIS departments issue regular reports to divisional managers on new hardware and software technologies that may be of departmental use.

Whatever the level of support, there are invariably jurisdictional disputes and disagreements over who gets to call the final shot. The expression "handshaking" was often heard at AMA roundtables.

> Connectivity of technology groups is essential, at least within my organization. There's just so much a user group can do. If we don't go beyond the training and the support aspects of our function, where the heck are we? We have to go beyond simple support for human resources and administration. Most of these groups have expanded into more technological [activities], and they've got the skills to do it.

The end users love us. We bought their new machines. We installed them, we approved them, we justified them. We had users come to us and say they can't get what they want through MIS, and we've said, "Well, we'll show you how to do it, okay?"

But the handshaking has got to happen now with the MIS group because, quite frankly, we can't go beyond the single-user pc or the smaller local area network without that centralized strategic plan.

There isn't a warm feeling between [MIS and micro support]. And I think that that's true in a lot of groups. MIS feels that we stepped on their toes. But, at least as far as departmental management goes, we have their ear. We've managed to make things work and be cost effective. By the same token, MIS has also realized that they've made some mistakes. So I think they're beignning to be sympathetic, and we're trying to work together. But I think it's going to take time, and there's still that question of who's going to hold the reins, who's going to be ultimately in charge.

But it creates a problem for the end user. You can't have MIS take seven years to do something we can do in seven weeks.

One thing I've seen is a tendency on the part of MIS to request that the end users adopt the technology that MIS has decided on, as opposed to their adopting the technology the end user needs and requests.

I'm in a position now where I'm currently straddling the two groups, MIS and the end-user departments. We went through reorganization, and I've discovered I'm now part of systems and operations; and I'm trying to figure out how to meet the conflicting needs of the two different groups. The MIS and operations people tend to take a longer-term view. They're constantly looking at strategic planning. And the end users focus on the situation at hand—"I have this problem that I have to fix by next week." And strategic planning is useless to them because over the period of a year, they expect the organization to have changed anyway. So they have needs that conflict ultimately with strategic planning. . . .

It's clear there has to be some sort of planning, and people have to anticipate what technology is going to be available next year and what the end user's needs will be at that time. But it's awfully hard to figure out what to do. It's easier to deal with problems that exist now.

In my organization, there have been two power groups that have set their own jurisdictions. MIS has come up with certain rules, regulations, and stipulations for the use of technology. Quite frankly, it was a case of "too little, too late." . . . We made decisions that really didn't make sense for some of the larger groups. One example: we developed a package for

> communications, electronic mail, and industry research. It gives us a lot of data; it downloads current information; it gives us an edge on our competition. It was a brilliant package. We piloted it in New York and everyone loved it; a partner can sit down and use it in five minutes, and he can make the thing sing.
>
> But it doesn't fit into the long-term strategic plan. We can't explore it for the U.S. because it doesn't ride on the hardware that the national office has deemed appropriate. If we'd had those lines of communication and not had the problem of whose territory we were stepping into . . .

DEPARTMENTAL HARDWARE

What technologies are currently being used in the departments? In terms of hardware, 82 percent report that area-specific standalone microcomputers are being used in at least one business department; 60 percent tell AMA that area-specific mainframes and minis support departmental computing; and 32 percent report LANs serving specific management groups.

As Figure 2-2 reveals, finance and administrative departments generally have first call on such departmental hardware, followed by human resources and sales and marketing. While Figure 2-2 gives the numbers supplied by the whole sample, note that manufacturing companies are well supplied with end-user technology. Among manufacturers, which account for 36 percent of the sample, 57.9 percent report area-specific standalones; 36.8 percent have area-specific

Figure 2.2. Technologies supporting end-user computing in departments other than MIS. (Whole sample: 295)

	Finance %	*Mktg* %	*Admin.* %	*H.R.* %	*Mfg* %	*Purch.* %	*R&D* %	*None* %
Area-specific standalone microcomputers	61.7	42.7	60.7	43.4	27.5	26.4	27.8	17.3
Area-specific mainframes and/or minicomputers	43.1	25.1	39.7	29.8	19.7	26.1	16.9	40.7
LANs serving specific management groups	15.3	12.9	18.3	10.8	7.8	6.8	10.8	64.7
Large firms [N = 51]								
Area-specific standalone microcomputers	72.5	49.0	78.4	64.7	27.5	33.3	29.4	5.9
Area-specific mainframes and/or minicomputers	39.2	17.6	33.3	25.5	21.6	21.6	17.6	41.2
LANs serving specific management groups	31.4	13.7	31.4	23.5	13.7	13.7	11.8	35.3
Midsized firms [N = 64]								
Area-specific standalone microcomputers	76.6	54.7	60.9	59.4	31.3	40.6	32.8	12.5
Area-specific mainframes and/or minicomputers	40.6	25.0	31.3	32.8	17.2	31.3	14.1	46.9
LANs serving specific management groups	17.2	18.8	23.4	18.8	10.9	12.5	17.2	59.4
Small firms [N = 160]								
Area-specific standalone microcomputers	53.8	35.6	56.3	31.3	28.1	20.0	26.9	21.9
Area-specific mainframes and/or minicomputers	45.6	27.5	45.0	30.6	21.9	26.9	20.0	36.9
LANs serving specific management groups	10.0	10.6	11.9	3.8	5.6	3.1	8.8	75.6

mainframes or minis; and 13.7 percent have LANs specifically serving the manufacturing function.

> Ours was an evolutionary process. . . . There was the mainframe technology, where everybody had a 3270-type terminal. From there we started to go into a local area network very early in the game, in the early 1980s. There was a sort of backward migration into pcs; we connected the pcs to the network architecture to create the LANs.

> We've given people Macs—taken away their main terminals and let the Macs be the workstations where it makes sense, where they're going to do spreadsheet analysis, things like that.

> I see things gravitating from the mainframe into local area networks, where the mainframe environment is now the central depository of the data, but not necessarily where the activity takes place. The activity is occurring, or the actual transitions are occurring, at the pc level or the LAN level. And the only thing that's going up to the mainframe is bulk data activity for the day.

DEPARTMENTAL SOFTWARE

Departmental software figures herald the "LOTUS revolution." By a bare margin (91.6 percent to 90.1 percent), respondents tell AMA that more departments are supplied with spreadsheet software than with word processing software. Figure 2-3 breaks out the responses to the question, *What software applications do end-users employ in departments outside MIS?*

End-user demand for graphics software has risen dramatically over the past two years. Only a third of those responding to a 1986 AMA survey were buying graphics software for end users; today, departmental penetration of this software is twice as great, nearly matching the

Figure 2.3. Software applications employed by end users in departments outside MIS. (Whole sample: 295)

	In Use %	*Finance* %	*Mktg* %	*Admin.* %	*H.R.* %	*Mfg* %	*Purch.* %	*R&D* %
Word processing	90.5	72.5	55.3	81.4	59.7	57.0	38.6	31.2
Spreadsheets	91.1	82.4	48.8	64.4	43.1	57.0	30.8	25.1
Database management	70.5	43.4	33.6	46.8	33.6	41.0	21.7	19.3
Project management	39.3	11.5	7.1	15.9	6.1	17.0	3.1	19.0
Graphics	67.8	44.4	29.8	33.9	16.3	30.0	8.8	20.3
Computer-aided design/manufacture*	30.6	1.0	1.4	3.1	0.3	29.0	0.7	15.9
On-line databases	49.2	28.8	21.0	22.0	15.3	14.0	11.9	13.2

*% of 100 manufacturers only

use of database management packages. A more modest rise, but nevertheless impressive, is registered by project management software, to 39 percent in 1988 from 28 percent in 1986.

AMA has no baseline data from earlier surveys to measure the growth in end-user access to on-line databases. For further commentary, see "Subscribers On Line," which introduces an essay by Richard C. Anderson, Jr., at the end of this chapter.

Most of this software is off the shelf, and vendors and user departments cooperate in adapting prepackaged software for special applications within the organization.

> The departments can scream for this and scream for that, but when you really break down what they're saying, usually it's one extra program or one little tweak of the software that will satisfy them. If there's a real change in the way we do business, then we quickly try to analyze the situation and give our software people the project. We're heavily involved in the evaluation process.

Corporate restructuring—downsizing, decentralization, and reorganization—proceeds without regard to the potential havoc it may wreak on information systems. Likewise, the onward march of technology, cheered by the bits-'n-bytes specialists in MIS, can leave departmental standards in tatters.

> Throughout the corporation, the whole bottom layer of the pyramid has disappeared. The whole clerking system for filing has disappeared; one secretary for 5 people has disappeared. Now it's one secretary for 200 people, and people do their own memos. . . . So the products you buy are word processing products, and you try to standardize, because you want everybody to learn the same things . . . It takes a couple of iterations to find which product is the best, and as products get better, you sometimes change.

> We started out with Symphony when we were all standalone pcs. As soon as we went into the LAN environment, though, Symphony was no longer applicable. We didn't need the communications. It took up too much memory. And the LAN software itself takes a big chunk out of the machine. So now we're back to LOTUS, word processing, and some DBase—and even with DBase, we have only one or two copies that we use just for development.

> In the past there have been software mistakes. The first I've seen was the switching of word processing packages. An entire department would convert to a new word processing package because it fit in with the perceived strategy. People ended up with a lot of different things, because something became a departmental standard and the people in the department followed it. So we [in MIS] lifted our standard setting criteria and said, "If you want to work with us, these are the things we can give you." And we opened our arms to embrace all different kinds of things.

> Training is a huge problem because people buy all these software packages on somebody's idea and nobody trains them fully. They all know a little bit about each package. But they don't know enough about a package in its entirety and they think, "Oh, someone else can solve this problem."

WHO SIGNS THE CHECK?

When departments use this technology—indeed, when departmental functions come to depend on it—the question of authorization inevitably arises.

> We go through cycles when a lot of authorization is needed to buy things and other times when practically no authorization is needed.

Many departments acquire and use computer technology with MIS/DP support and consultation, the AMA questionnaire proposed. *Others do so entirely on their own. . . . We seek definition of how this works in [respondent] organizations. We ask who must* authorize *various end-user tasks, and who must approve the purchase of end-user technology; and if these are shared responsibilities.* The questionnaire included the information center (IC) in its checklist, defining an IC as "a discrete unit charged with assisting end users in computer applications."

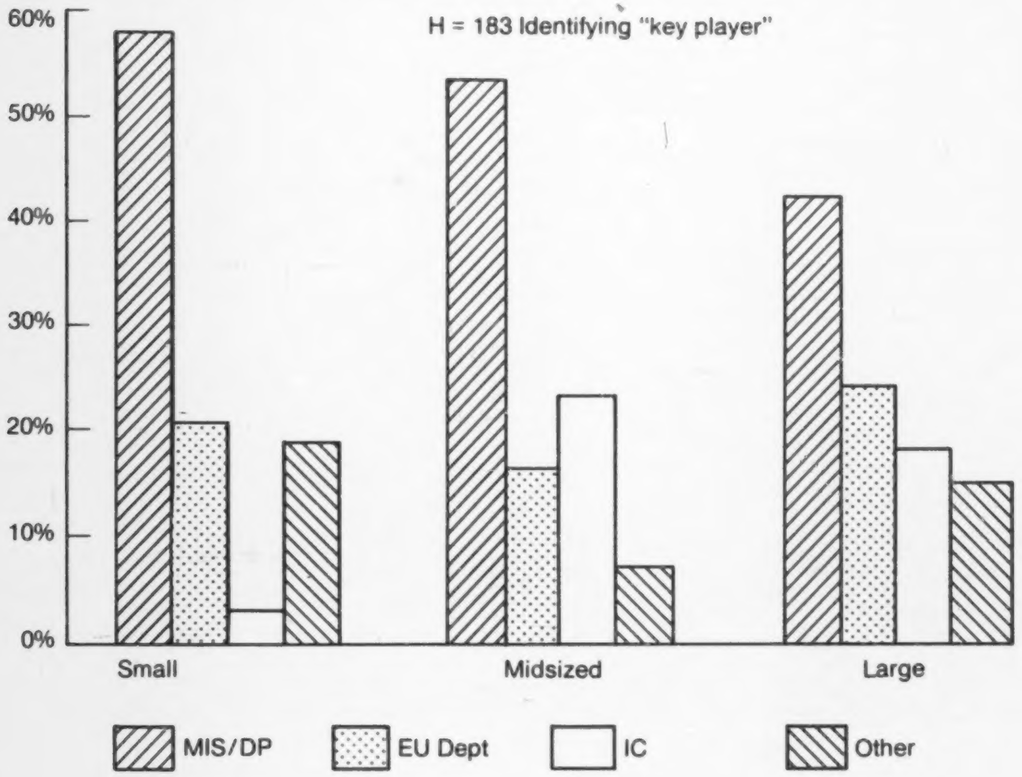
But while more than one manager usually signs off on a purchase, some managers are "more equal than others" in authorizing such expenditures. *We recognize that in each task or purchase, there is often a "key player" whose approval carries most weight in "buy" decisions,* the questionnaire continued. *For each checklist item, we ask you to identify that "key player."*

The results indicate that centralized MIS/DP units retain major authority in purchases of mainframe hardware and software, even where such technology supports end users in the departments. Micro-mainframe links and access to corporate databases are likewise the purview of the MIS function, although end-user departments are nearly as likely to control access to independent on-line databases as is MIS.

But where micro technology is concerned, purchase authority has increasingly passed to end-user departments or to information center managers. When asked to identify the "key player" in authorizing micro purchases, companies are as likely to nominate the end-user department, the information center, or a non-MIS signatory as to name the MIS/DP function.

Figure 2-4 demonstrates that while MIS/DP remains top dog in authorizing micro hardware purchases, its primacy is waning. Less than half of large-company respondents cited MIS/DP as the key player when buying micro hardware. Even among small firms, fewer than 60 percent gave the nod to MIS. As Figure 2-5 demonstrates, MIS has even less sway in micro software purchases.

Figure 2.4. Key player—micro hardware purchases.



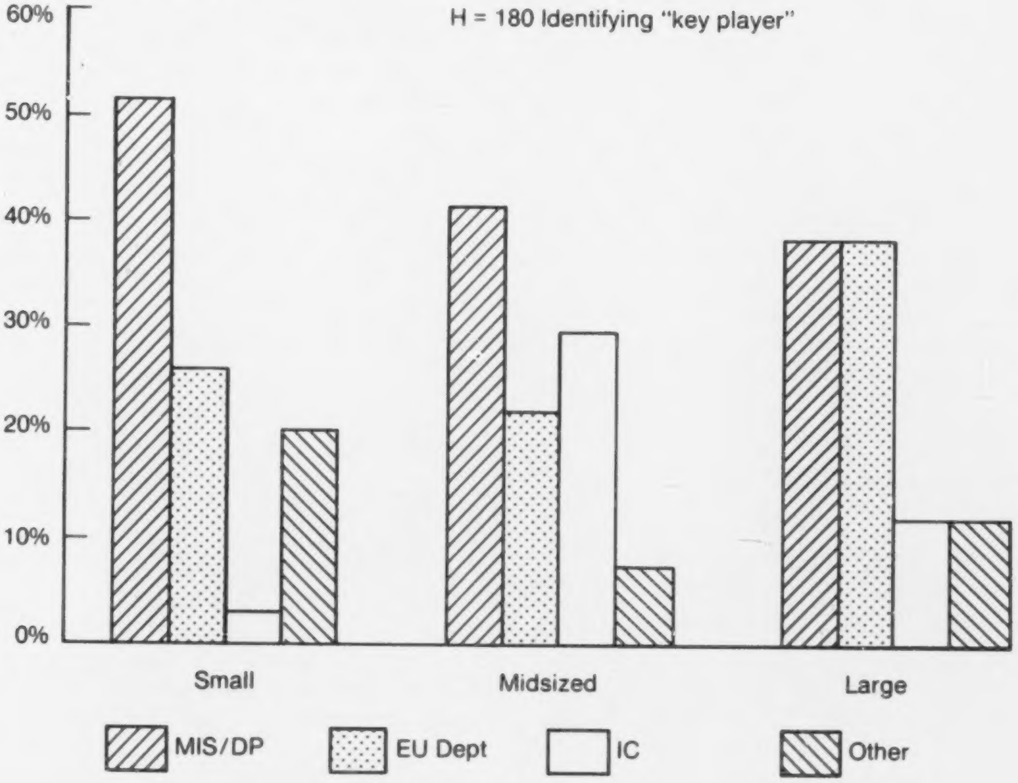
IF NOT MIS, THEN WHO?

The figures catch a fascinating moment of transition. Among large companies, the end-user departments have captured the "key player" flag; as many firms cite the end-user department as they do MIS itself as the primary signatory needed for micro software purchases. Small firms cite "other" in nearly as great a number as the end-user department; these "others" are senior managers—CEOs, executive vice presidents, and chief financial officers who must sign onto significant cash outlays.

And among midsized firms such authority rests most often with the information center, the unit designed to serve as a bridge between MIS and end-user departments, and from which (its defenders insist) a chief information officer should rightfully emerge. Readers are no doubt familiar with the arguments surrounding the role of the IC; two previous AMA reports have covered its history and responsibilities.

Is the IC a transitory phenomenon, put in place to introduce computer technology to end users and to help them develop basic computer skills? Or will it prove a permanent unit, developing special applications software and assisting departmental managers in planning,

Figure 2.5. Key player—micro software purchases.



organizing, and controlling end-user computing in the departments? Discussion of these issues and a study of AMA's survey findings regarding information centers will be found in Chapter 3 of this report.

> We don't have centralized purchasing any more. We gave that up about three years ago. There are some guidelines. For anything under $1,000, any vice president or manager can go and write out a purchase order. . . . When you get up to the $1,000 plateau, you have to go along with the guidelines, by getting bids. We're diligent about finding a vendor that's going to support the product.

> On the one hand, there's delay in getting up the order because orders are coming from all over the company. On the other hand, there's a tendency to choose a vendor that is often not the one we want, and to pick vendors just because they're the cheapest. Sometimes when the end users do specify a particular local vendor, they are cutting us off from support, and while they may save a tremendous number of administrative headaches they introduce their own set of problems.

> For instance, we have enormous difficulty upgrading software. The vendor's upgrade policy says, "Send back this and page 73 from your manual." Our contracts people simply will not handle that. And they give different answers to different people.
>
> A particular organization usually gravitates toward one or two individuals who make the decisions and honcho getting the software and hardware for that particular area. And at the next level, the higher expense, there's an individual who's responsible for that group's purchases, and who monitors all the administrative pcs, usually in the management office.
>
> At our shop, a corporate technology office sits above all that as overseer for the whole bank. It publishes policies, procedures, recommendations for software and hardware, from the mainframe all the way down through the micros and the micro software. These again are recommendations, and most of the input comes from the end-user community—based on what they've found they liked.

JUSTIFICATION AND CHARGEBACKS

The AMA questionnaire tracked two additional lines of policy surrounding end-user purchases: the justification procedures that precede the purchase and the budgetary assignments that follow the purchase or rental, including training, repair, and assistance.

Sixty percent of the responding worksites require written justification forms for the purchase of end-user hardware, 50 percent for end-user software. In both categories, the larger the company, the more likely it is to require written justification. But flexibility is key in the age of departmental computing. Departmental need, rather than organizationwide standards, has become a determining factor.

> Our philosophy is that you need what you perceive you need to do your business—sort out the products at hand, the different softwares that are available for purchase, and add some homegrown stuff.

Written justifications are required by 57 percent of the AMA sample before standalones or local networks may be tied to the corporate mainframe. Seventy percent of the large companies have initiated such a policy, and nearly as many midsized firms. With central databases increasingly seen as a fungible corporate asset, and with connectivity more and more the norm, respondents are making sure that they can track the flow of information.

Three-quarters of the large companies and half of the whole sample charge hardware and software purchases back to end-user departments. Forty percent charge back maintenance and repair costs; 32 percent charge back training costs. In 24 percent of the responding firms, the MIS department charges end-user departments for time and overhead incurred when developing special applications software for departmental use.

> I think it works best when the end users pay the bill and take responsibility for the purchase. The key thing is to get them to take that responsibility.

A PLAGUE OF VENDORS?

As the lines of responsibility for purchasing end-user technology become more complex, vendors identify new market segments. If the departmental manager or the information center is the "key player" in certain purchases, that is where the salesman wants to be—often to the dismay of MIS professionals. This implies that end users know their needs; MIS often does not.

> I have a real concern. I am not so sure that these people [departmental managers], while they understand the business, understand some of the more traditional disciplines of data processing. They are hoping to integrate the technology and the business strategy within the unit, and that is just not happening. It may happen after a little bit, but right now it is not happening. And it is of concern, because there is no driving force centrally.

> Interestingly enough, I think that five years ago the users were down at the low end of the curve of knowledge and expertise, and MIS was slightly above them. This has reversed significantly. Now, the users really do have a lot more expertise than the MIS people.

Opportunity for the vendors need not create chaos within the organization, as Jerry Koret of DataEase International argues in his essay (see below). For senior managers at organizations where purchases are a departmental responsibility, to be aware of the problem is a major step in solving it. What are the key questions to consider? In the questionnaire for our *1986 AMA Report on Information Centers*, we listed 10 criteria that information managers take into account when evaluating end-user hardware and software, and offered a 5-to-1 scale to rate the importance of each criterion, a *5* representing the highest importance, a *1*, little or no importance. The results are instructive:

	Hardware		*Software*	
	Average Rating	*Pct at 4 or 5*	*Average Rating*	*Pct at 4 or 5*
Vendor backup/support	4.36	80.4	4.16	75.8
Ease of use	4.29	80.9	4.69	95.3
IBM compatibility	4.29	77.2	4.17	75.0
Range of applications	3.97	66.4	3.68	56.4
Ease of instruction	3.94	65.0	4.35	85.0
Mainframe compatibility	3.84	63.5	3.30	43.7
Cost	3.74	57.3	3.63	53.9
Volume discounts	3.35	48.5	3.19	43.8
On-line help facility	3.09	35.8	3.78	61.4
Tutorial modes	2.95	29.1	3.60	55.4

[N = 529 respondents to AMA questionnaire, 1986]

To quote the *1986 Report*:

> The single most important concern to infocenter evaluators is, naturally, ease of use—that is, easy for end users, not for the professionals on the IC staff. This is overwhelmingly true when judging software. "User friendly" is no mere slogan to those who must train, assist, and support nonexperts. It applies to hardware as well, where it ranks a close second to vendor support.

Some of these criteria are subjective (ease of use and instruction, vendor backup and support), but most are straight "yes or no" questions. A departmental manager armed with such a list, and supported by end users willing to test the hardware or software under consideration, can often render a professional judgment. But an evaluation by an MIS specialist couldn't hurt.

> I wouldn't call them a "plague of vendors," but I find that vendors always give incomplete information to the users. Actually, one of my biggest problems is *The New York Times*, because that's where my people get most of their information about pcs. I know when I read the Sunday *Times* I'm going to get a call on Monday or Tuesday asking, "What about this—this laser network? Why don't we put it in?" I've gotten a couple of good ideas from that, but the source of information for most people in my company is *Science Times*.

> I'll tell you, we got such a burst of Leading Edge requests when *Consumer Reports* put something out about Leading Edge; and you know, they're noted for their reviews of refrigerators, right?

> Not only do I perceive [vendor penetration of the end-user community] as a problem, but I can see that an inordinate amount of time is being wasted by everybody being involved in the buy-cycle. People say, "Where the hell is my equipment? When is it coming in? Is it installed properly? This thing came DOA." They [the end-user department] are talking to 25 vendors, and each one of them is trying to make some sort of deal for $10 less for this modem versus that modem. And you're losing money because you don't have the volume of a centralized office.
>
> What you have to do is agree that the user's got the authority to choose and to authorize equipment to a certain degree. I know we have two sign-offs on it. But you've got to have a centralized purchasing function. I don't want it. It's not my job. That was a big fight. . . . My argument was: "I'm not a purchaser. I don't want to talk to these vendors; I don't really give a damn who they are. That's what my purchasing department is supposed to do. I will tell them what I want and when I want it."

WHO AND WHERE IS THE WORK GROUP BUSINESS USER?

by Jerry Koret

More than three-quarters of work group business users are in jobs that are not computer related. Seven out of 10 work for multidivision organizations, and almost half are in commercial enterprises. Almost two-thirds are in the business of providing a service, while just over a quarter are in manufacturing. Six out of 10 work group business users are employed by companies with revenues greater than $100 million a year and 500 or more employees. Two out of three of those are in the *Fortune* 500 with revenues greater than $500 million a year and 1,000 or more employees.

From these facts, drawn from AMA survey results and from DataEase's own research, we can conclude that the work group business user is most likely to be a noncomputing professional working in a large company at the departmental level.

What and Why?

Technical issues or being on the leading edge of technology have little or no importance to the work group business user. He or she is not impressed with the "mystique" of the personal computer: more likely, the pc represents a "glorified typewriter" that can make his or her job easier.

The work group business user is interested in improving his or her job skills with information about technology and products and is not particularly interested in computer industry news. He or she is two times more likely to be using an older technology pc (8088-8086) than an AT-compatible. Only about 1.8 percent are using new technology (80366). In work groups at the departmental level, work group business users will have almost twice the concentration of database and spreadsheet products in their departments as occurs in the overall installed base of like products in the marketplace.

We can draw the inference that for work group business users, the use of the tool is more important than the tool itself. This contrasts with respondents whose job titles relate to supporting the use of computers, where the technology tends to be on the leading edge (80286-80386).

Key Issues When Purchasing Software or Hardware

Since expenditures for corporate professional applications represent at least one quarter of the acquisition budget for new software at the departmental level, the key issues relate to the end user. Highest priority concerns are with consistency of user interface and productivity at the departmental level.

Accommodation to user needs and satisfaction with applications are the most frequently mentioned "hot buttons," while access to free telephone support and getting needed applications without copy protection also rank high as end-user issues. An interesting side note: being able to provide scheduled software updates to the work group business user is also important.

When dealing with the vendor, the work group business user is interested in seeing cooperation among vendors to allow for easier integration of products. While using new technology was not important to the work group business user, end users were concerned that the vendor be positioned on the leading edge to assure the user's comfort level: he or she wants to know that the vendor's product will be ready for new technology when the end user is ready for or needs that technology. He or she expects the vendor to introduce new products that support new hardware technology on a timely basis.

Unimportant Issues

Because of his or her lack of interest in new technologies, the work group business user has indicated no concern as to whether there is a Windows, OS2, or Mac version of a product when he or she is considering the purchase.

The only time the issues of volume purchase agreements and whether the vendor has a direct sales force become important is when the work group business user influences 500 or more personal computers.

SQL or UNIX are nonissues to work group business users at this time since slightly more than 75 percent are using IBM or IBM-compatible computers.

Since many personal computers are still standalone machines, pc security was not high on the work group business user's list of issues. However, the ability to upgrade to new hardware technology without inconvenience was important.

Since the work group business user is likely to have older technology, pc work-group applications that require newer technologies, such as image, FAX, and document management, did not rank high on the issues list.

Summary

Vendors of products to the work group business user always have to remember to offer technology implementation as means to solve the user's problems without letting the technology get in the way of the solution.

PRODUCTIVITY: THE BOTTOM LINE

An information center manager at an East Coast defense facility once told AMA that she measured end-user productivity by counting keystrokes. "Everyone has a monthly quota," she told our incredulous reporter. "If they aren't up to quota, they go on probation; if they're not off probation in three months, we take away their pcs."

Two images immediately came to the reporter's mind. The first: a military ceremony, complete with rolling drums, where the officer in charge breaks the offender's keyboard over his knee.

The second: an office on the last day of each month, as end users frantically pound their keyboards to get up to quota.

The very definition of end-user computing means that the person who uses the data does the computing; because of this, pure and simple data input—the full-time keypunch job—is not a true "end user" activity. Departmental computing changes the rules: each end-user *department* may well have individuals whose job—whose only job—is to enter data. Here—but only here—we grant that counting keystrokes is a viable measure of end-user productivity. Far more often, other matters come into play: the end users who are so enamored of the machine that they invent tasks for its use or the expert who is less expert than he or she may think.

> I had a request for Turbo PASCAL because a new person was joining the company. I thought, "Oh, this is great, this guy knows everything." I was even a little threatened by him, but I thought, "Okay, he really knows his computers."
>
> So they called me after he arrived because he was having a problem—his program wouldn't compile. Now, I don't know anything about PASCAL, but there's something about memory size overflow, and I just happened to know that PASCAL has this limitation of 64K in a module. And it turns out that he's using an earlier version than the version we bought for him; he's using his own software; he wasn't using the manual. And when we upgraded his software for the new version of PASCAL, he said, "Oh, don't worry, I've already broken it up into littler pieces, and they all call one another."
>
> He did it inefficiently in the first place, then he made it more inefficient and ignored the feature of the new version of the program that made it possible just to write without regard to the size of the program. The barrier was that he learned to do it one way, and it's extremely hard to learn to do it any other way. And I sympathize. It's really hard to learn software.

Roundtable participants generally agreed that few nonexperts make full use of either the hardware or the software with which they are supplied. But like the speaker quoted above, they are, for the most part, sympathetic. For all the user friendly tools supplied by vendors, and despite the fact that computers have become commonplace on desktops, acquiring and applying the skills needed to get full use from these remarkable but unsympathetic machines is no easy task.

> I think the users coming in do not take full advantage of the machines or the software. The average user has not met the capacity in the machines as yet. Nor the software. I think you'll find that most of them gravitate to what they need to do and don't explore any further. We have recognized that and have had some in-house training that goes on in the evening at the user's expense; we also have daytime courses customized to particular work groups. If you want to, you can get the education.

> It depends on what they need to get the job done. If they need to do more, then they explore

more. I don't really find people spending the time to learn the entire product end-to-end, because they just don't have time during the course of the day to do that.

Oftentimes they're just doing a manual process through the system. The perceived value is that it's more fun, and there's some value to having it be more fun. But when you look at some of the applications that they're using the systems for, the heavy user is often just duplicating what he might have done through a LOTUS spreadsheet. They're not exploring, and it's hard to drive them to look at new ways of doing their jobs that will make them more efficient, rather than using the machines just to duplicate what they currently do.

I think our end users need both more and less. The same set of end users is often oversupplied with certain types of things. On the other hand, a lot of them have needs for presentation graphics and are way undersupplied. They're not aware of what's available or what the potentials are. They'll use what's in front of them, use LOTUS 1-2-3 graphics, and not really be aware that there's a lot more that they could be getting that would be better suited to their needs. They just don't know of its existence. A lot of them have active needs for desktop publishing-type applications, but they've barely heard the buzzword, let alone what it can actually do for them.

I think it has do to with the first impression of the computer, because most of our users learned to use their software by what I'd call "learning by torture."

I can relate to it when I see an instruction in a manual for new software that says something like "Experiment with the number of buffers to determine the number that is best." I've got to change the configuration system and turn off the computer and reboot it and then try another setting to find out which buffer setting is going to work best with this software. This is ridiculous, but that's the way most people have learned to use their software. Manuals are forgotten or thrown away or whatever. And so they've gone through this excruciating process of getting it just to do one thing, and then they never want to learn anything else. It's like they'd rather eat raw oysters, octopus, whatever, than try another software package.

So, I think people are underutilizing their computers. But, you know, I'm trying to build in better training by sending people to courses that cost money, and building that into the cost of the system.

One way to measure productivity is to count keystrokes, especially if it's a clerical job and it has a daily, weekly, or monthly cycle. Another way is for people like me or one of my assistants to sit down at somebody's desk and do his or her job for a couple of days. I mean literally to have the freedom to do that—the actual clerical task or just the inputting. If you do that person's job for four hours, you know what technology is needed, you know what you could do to enhance the person's productivity. I think that works for us very well.

SUBSCRIBERS ON LINE

Almost by definition, on-line databases are end-user tools. To gain access to information stored in a central source, and to use that information—as received, or as reconfigured on a desktop or departmental computer—enables end users of every stripe to analyze, to plan, and to serve their customers.

More than half the respondent worksites subscribe to at least one on-line database for the benefit of end users; nearly two-thirds of the large-company worksites do so. Such worksites have an average of 76 end users with on-line access. AMA estimates that anywhere from 5 to 20 percent of the workers there are so served. Naturally, service companies provide on-line access at a greater rate, and to more people, than do manufacturers; for financial institutions, information on market fluctuations and interest and exchange rates are the very lifeblood of business. But 44 percent of manufacturers also subscribe.

The most popular service among the dozen included in the questionnaire checklist is Dow-Jones News Retrieval—the computer-age version of the old stock ticker. Over 30 percent of the corporate headquarters surveyed take the Dow-Jones service; 21.4 percent of all respondents do so. CompuServe runs a close second, at 20.7 percent; the Mead Data Central trio of LEXIS, NEXIS, and EXCHANGE runs third, at 15.9 percent.

These services do not come cheaply. Asked to estimate their 1988 bill for on-line database usage, respondents gave an average figure of $49,000; for large worksites—those with a population of over 2,500—the average was nearly $100,000.

TOO LITTLE OR TOO MUCH?

Here as elsewhere in the realm of end-user computing, there arises the problem of under- or overutilization of an enabling technology. Here as elsewhere, an imbalance can have a significant effect on end-user productivity. And here as elsewhere, inadequate training is at the root of underutilization, whereas overenthusiasm for the tool leads to greater monies and more end-user time expended than is necessary to do the job.

AMA asked Richard C. Anderson, Jr., vice president and executive officer of Mead Data Central's Corporate Information Services Group, to share his insights into the problems of training and cost controls for on-line database usage. His essay follows.

ON-LINE DATABASES: THERE'S MORE THAN JUST INFORMATION ON THE LINE

by Richard C. Anderson, Jr.

Paul Strassman wrote in *Information Payoff: The Transformation of Work in the Electronic Age* (1986), "Information has economic value only when it is used by people to make things or deliver services. . . . [V]aluable information gains still more in value when it is listened to, exchanged, or distributed.'' Information gains in economic value when people can access it more easily, manage the volume, find an answer (or unexpected answer[s]) in a reasonable amount of time, and do it at a reasonable cost.

Over the past 10 years, organizations have used technology to get information to more people within a shorter time frame, thus increasing its business value. At the same time, companies have significantly increased their capital investments per knowledge worker, in both training and equipment. The challenge has been and remains the effective management of these new investments in technology.

Effective management, as Strassman notes, ''provides workers with incentives to move low-value work to others for whom this work would amount to a high-value task.'' Word processing, for example, changes low-value work (retyping revisions of drafts) into a less tedious task performed by a higher-skilled word processor.

Whereas critics argue that office automation merely reallocates work and the cost of work, at its best it:

- Accomplishes work more efficiently.
- Opens a wealth of possibilities for both the individual and the organization in terms of what can be produced in a given period of time.

AMA research over the past five years shows, by and large, an increasingly greater investment in high technology. The hoped-for benefits include higher white collar productivity, better and faster decision making, and improved competitive advantage. It's impossible to quantify whether these goals are being achieved. However, if one can gauge progress by the willingness of organizations to make these investments, then there has been progress. Nonetheless, such an assumption is tenuous.

The survey results do make a number of conclusions possible. For example, the data indicate that organizations have focused on managing *internal* information. Their use of *external* services that electronically deliver information from outside the organization is relatively low.

Two indicators support this conclusion:

1. In over 75 percent of the organizations responding to the AMA survey, less than 25 end users, if any at all, have on-line access to external database services. This situation holds true in spite of the fact that these users have access to the technology needed to make use of the services. Ironically, the typical knowledge worker spends 20 percent of his or her time searching for information created outside the organization, according to a Mead Data Central study.
2. According to the current AMA study, the mean expenditure per organization for on-line databases is a mere $2,700 a year. Proportionately, this expenditure amounts to less of the information systems' departmental budget than coffee does to the overall organizational budget. Only 10 percent of the respondents spent more than $10,000 a year for on-line services. While these figures may not be representative of

industry as a whole, because of the high number of nonreporting organizations, the mean derived ($2,700) is consistent with Mead Data Central's own experience.

Except for law and financial services, in which research via computer applications has been intensive, most of U.S. industry uses internal data bases only. Hard copy and consulting services provide most of the information external to the organization.

Correcting the Problem

Current strategies in the database industry focus on removing the barriers that keep these services from reaching their full potential. A number of changes must occur before the use of external information services can be broadened. They include:

- Management and user attitudes vis-à-vis the importance of these services.
- Current industry practices regarding delivery systems, interfaces, training, and pricing.

The first issue raises questions beyond the scope of this chapter. Given what the business climate of the 1990s will be, if managers don't know what is happening outside their organizations, their companies will not be in a position to gain a sustainable advantage over their competition, either domestic or foreign. Services such as LEXIS and NEXIS make it possible to manage the incredible amount of published information managers have to digest in order to make sound decisions.

Over and above the acceptance of the crucial role of external databases are the problems relating to training and cost control. At present these constitute two key barriers to widespread use of data base services.

Training

Addressing the On-line News Retrieval Conference in London in 1980, Jerome S. Rubin, president of Mead Data Central, one of the few money-making companies in the field, said:

> Why, in contrast to Mead Data Central, have most electronic publishing ventures so far been at best only marginally successful? While there are many factors, the single most important one has been a tendency to focus on the database at the expense of the delivery system.
>
> People have been so concerned about what information they would be able to offer that they have all but ignored the means by which users would search it. As Gertrude Stein would say, "A computer is a computer is a computer." If the database was valuable, an adequate system could be built or bought. That was a costly error.

Today, with some exceptions, the landscape remains unchanged. Even Mead Data Central, which is widely recognized as having a search system that is flexible and easy to use, has not yet made the breakthroughs required to deliver these powerful technologies to the average end user. Traditional training has not solved this core problem.

Since its inception, Mead Data Central has trained over 400,000 professionals in the use of its services. Each year, it trains some 50,000 more. Typically, it spends a half-day with each new user intensely reviewing the mechanics of searching the system. Additionally, it spends countless numbers of people-hours following up with one-on-one assistance and refresher courses. In spite of the comparatively easy interface and the investment of time, people, and money, only a fraction of the trained user population ever become intensive users of the system. This is explained, in part, by the nature of their jobs—their functions do not demand regular, ongoing access, or so they think.

The reality is twofold:

1. The system, as friendly and flexible as it is, is still complex.
2. The users, as professional and motivated as they are, do not know how to relate the system to their jobs. They have never been taught to do so.

Because of the amount of time needed to learn the mechanics, and the subsequent failure to retain the knowledge due to lack of ongoing exposure and practice, users have never been able to integrate their training with practical, on-the-job applications. Trainers have not been able to focus on the real educational mission, which should be teaching the users to maximize the power of this tool to be more productive and effective in doing their jobs.

In the legal industry, where research is an integral part of the professional's job, the emphasis on mechanical training has brought results. Because of the research orientation of law, Mead Data Central has been able to become the largest electronic publisher of legal research services in the world. And the traditional training approach is used.

In corporate America, however, where research is not institutionalized, the approach to systems design and training needs to evolve further. The first step is to eliminate the need for mechanical training by designing user interfaces that are intuitive. This must be done, however, without sacrificing the power and flexibility of the search system itself. The use of a new pc interface (soon to be released by Mead Data Central) may provide an answer. It is also expected that as the use of IBM's Presentation Manager and Microsoft's Windows become more widespread, other services will develop interfaces between users and their systems that reduce the need for mechanical training.

Once this happens, advanced applications-oriented training will evolve. This kind of training helps the user understand how to use the tool for improved job effectiveness. Both end users and information center managers need to start demanding this level of vendor design and support during the vendor selection process.

Cost Control

The second major deterrent to expanded external database use is the pricing structure employed by the on-line industry. What was once a strength is fast becoming a significant barrier to expansion and effective use.

When the industry was in its infancy, the targeted customers were professional researchers, often employed by the organization's library services division. Library services was then, and often still is, a cost center with a limited budget.

However, the ability of the library to serve the diverse needs of its organization's clients is restricted. Because most hard-copy reference services are sold on a subscription basis and because budgets are limited, the amount of information that can be purchased on a fixed-expense basis is also limited.

With the introduction of on-line services offered at a fixed fee on a transaction basis, libraries were able to expand the amount of information at their disposal, since the fees are relatively low and the subject content of these services is very broad. At the same time, the library can pass through the research costs to the end-user department, thus expanding its relative purchasing power. Since corporate libraries have traditionally been staffed with professional researchers skilled at using these new systems, the arrangement has been very cost effective despite the charges, which often average over $150 an hour.

However, as services expand beyond centralized access through a group of professionals and extend to the level of the white collar professional, the lack of viable subscription pricing alternatives hinders expansion.

There are several reasons for this:

1. With a transaction-based pricing structure, on-line services are difficult to budget. Since the end-user department has to absorb 100 percent of the expense, unlike the research center that can pass the costs through, this unpredictability creates a use barrier.
2. End users are potentially greater in number and less experienced in using on-line systems. Because transaction-based pricing structures favor efficient users, the expansion of services to novice users creates a cost uncertainty in the minds of administrators charged with managing budgets and expense levels.

Additionally, since external information is not a top priority for senior management in most organizations, middle managers are reluctant to introduce a potentially very expensive service into their departments. In this reluctance, the price per transaction itself is not an issue. The economic value of the services to the user is often more than justified. For example, what is the economic value of information that directly affects a decision to invest $50 million in a new product launch?

At issue is the ability to predict the total cost of information to the organization or department over 12 months. This is a particularly difficult question when the service has just been introduced and the benefits to the organization have not yet been proved. The task of demonstrating the cost effectiveness of these services rests with the users. The fear that services will cost too much and result in budget overruns is often an inhibitor that prevents users from experimenting and discovering the hidden value for themselves. The Catch-22.

One solution is to provide an alternative to the transaction pricing structure that on-line services currently feature. Fixed-priced, subscription-based pricing alternatives are an innovation that will bring us full circle in the evolution from hard-copy to electronic information services. Based on the content desired, the time of day that access is permitted, and the number of users that must be supported, a subscription-priced package will let organizations obtain access (on an unlimited basis in terms of the number of questions that can be asked) for a yearly fee that is cost effective, budgetable, and predictable.

Users can access services, based on the content they have preselected, without worrying about the amount of time they spend on the system. They can find the answers they need, when they need them. This arrangement also frees the administrator from worrying about budget overruns.

Free to apply the power of on-line technology to all external information problems, users become effective at using the technology to improve their productivity. At the same time, the organization is able to manage its information dollar more efficiently.

3

The Information Center: Maturity

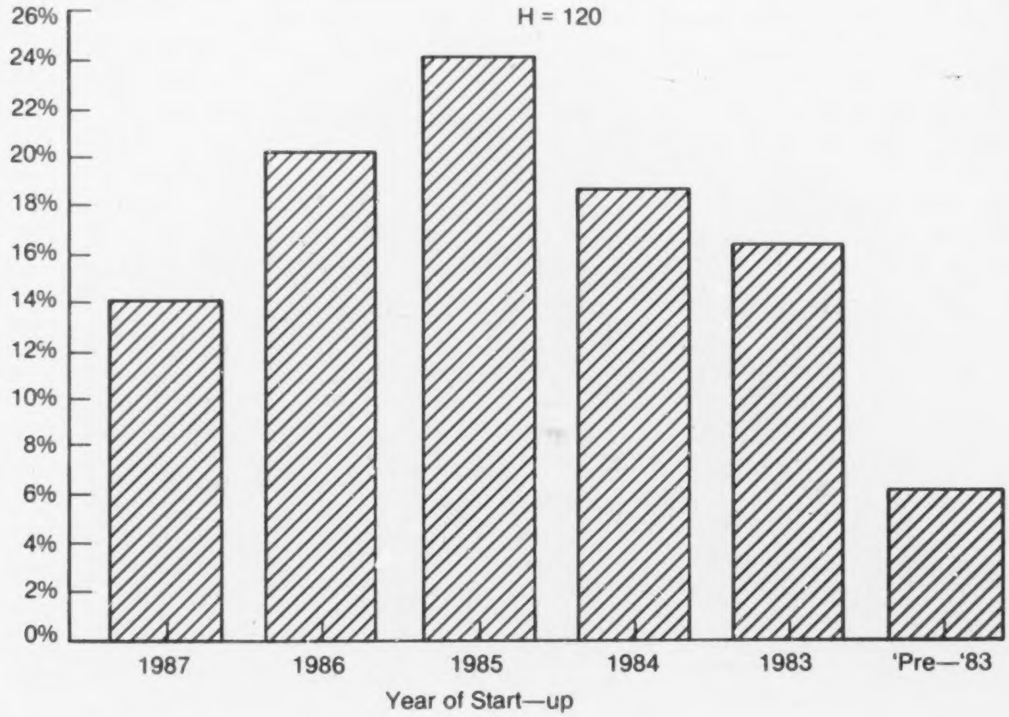
I think of my job as that of a change maker. The information center will never go away. The name may change, but organizations need a transition—to facilitate the introduction of new technology into the corporation.

IN 1984, WHEN THE American Management Association first surveyed end-user computing, a third of the respondents to our questionnaire had an information center (defined as "a discrete unit charged with assisting end users in computer applications"). In the current sample, 58 percent of the respondent worksites have an infocenter, and an additional 7 percent have plans to put one on line in the near future.

The wider scope of the present survey, however, reflects a change that the mere counting of such units cannot truly measure. Today, end-user computing *is being managed* at virtually every worksite—a condition far different from what we found when we first looked at the field. At 80 percent of the large firms in the current sample, at 70 percent of the midsized firms, and at just under half of the small ones, an information center is responsible, at least in part, for that management. At other worksites, the lessons learned by infocenter managers (and reported by AMA in two previous reports) are guiding MIS and departmental managers even where no formal end-user assistance units exist.

Past findings further confirmed by the current study: corporate headquarters are more likely to support infocenters than other worksites (69 percent to 49 percent); service organizations,

Figure 3.1. Information center maturity.



with a larger incidence of desktop computing than manufacturers, are more likely to host ICs (64 percent to 46 percent).

But the go-go years are over. The boom in information center start-up occurred in 1984-86. The *1986 AMA Report on Information Centers* could state that "more information centers were formed in 1985 than in '84, more in '84 than in '83, and more in '83—the year the IBM PC made its impact—than existed to that date." As Figure 3-1 makes clear, infocenters today are no longer an innovation.

BUDGETS: HEFTY AND GROWING

Although most information centers continue to operate under MIS budgets, one out of 4 reports a budget line independent of the MIS function. In 7 out of 10 cases, 1988 IC budgets for salaries, equipment, and overhead will increase from 1987 levels, usually by 6 to 10 percent, but almost as frequently by 20 percent or more. Fifteen of the 171 surveyed ICs, or 9 percent, will decrease their budgets—5 of these by a noteworthy 20 percent or more (see Figure 3-2).

Figure 3.2. Information center budgets, 1987 and 1988.

		Total	*Small*	*Midsized*	*Large*
1988 budget increasing or decreasing from previous year	Increase				
	No.	120	52	33	28
	%	70.2	69.3	75.0	70.0
	Decrease				
	No.	15	7	3	4
	%	8.8	9.3	6.8	10.0
	No change or not reported				
	No.	36	16	8	8
	%	21.1	21.3	18.2	20.0
Pct of increase: *(Pcts of 120 ICs reporting increase)*	1–5				
	No.	25	11	7	5
	%	20.8	21.2	21.2	17.9
	6–10				
	No.	36	13	12	9
	%	30.0	25.0	36.4	32.1
	11–19				
	No.	15	9	4	2
	%	12.5	17.3	12.1	7.1
	20 or more				
	No.	31	13	6	10
	%	25.8	25.0	18.2	35.7
	Not reported				
	No.	13	6	4	2
	%	10.8	11.5	12.1	7.1
Pct of decrease: *(Pcts of 15 ICs reporting decrease)*	1–5				
	No.	0	0	0	0
	%	0.0	0.0	0.0	0.0
	6–10				
	No.	4	3	0	0
	%	26.7	42.9	0.0	0.0
	11–19				
	No.	2	1	1	0
	%	13.3	14.3	33.3	0.0
	20 or more				
	No.	5	2	2	1
	%	33.3	28.6	66.7	25.0
	Not reported				
	No.	4	1	0	3
	%	26.7	14.3	0.0	75.0

Where budgets decline, accounting methods rather than less activity may be the cause. The nature of infocenter budgeting is changing, according to IC managers interviewed. The trend is toward chargebacks to end-user departments—charging back training expenses as well as technology purchases.

> We no longer pay for our services: our users do. That's why we've got the satellite information centers springing up. We get chargebacks for almost everything. Users and their managers are starting to ask, "What am I getting for my dollar?" And as a result, our services are becoming more directed to real needs and not arbitrary things or flukes. We are addressing more of the business at hand.

AT YOUR SERVICE

Most information centers—89 percent—report that they assist all end users at the worksite; the rest help end users in selected departments, functions, or jobs. As departmental computing becomes a reality, the infocenter plays an increasingly vital role by enabling departmental personnel to perform tasks heretofore handled by a centralized MIS function.

What actual services do information centers provide? The AMA questionnaire listed a baker's dozen, and asked not only whether the respondent centers perform such tasks, but also how frequently they are requested. We provided a scale from 3—meaning the service was very frequently provided—down to zero, indicating that the respondent center did not perform the listed task. Figure 3-3 tells the story.

Among these tasks, connectivity is the rising star. As recently as 1986, only a third of the information centers under study supervised micro-mainframe links, and the mythical "Year of the LAN" had yet to occur. Today, 86 percent of infocenters provide this service, and a

Figure 3.3. What do infocenters do—and with what frequency?

	**Provide service*	*Do So frequently*	*Do so commonly*	*Do so infrequently*
Assistance in end-user hardware selection	92.1	59.9	26.3	13.8
Assistance in end-user software selection	94.0	50.6	37.2	12.2
Creating applications software for end users	88.0	36.7	27.9	35.4
Evaluating mainframe/mini hardware for end users	54.0	39.1	20.7	40.2
Evaluating mainframe/mini software for end users	44.7	48.6	31.9	19.4
Evaluating microcomputer hardware for end users	89.7	51.4	31.8	16.9
Evaluating microcomputer software for end users	90.3	48.3	36.2	15.4
Training in programming languages	49.4	18.3	23.2	58.5
Training in use of hardware	94.6	42.8	42.1	15.1
Training in use of software	97.0	49.7	37.4	12.9
Computer maintenance and repair	68.3	46.5	28.9	24.6
Hotline services	75.0	51.7	29.2	19.2
Links to mainframes or networked pcs	85.9	35.7	30.7	33.6

*Pcts of 171 information centers in sample third of those cite it as "frequently provided"—dovetailing neatly with the 35 percent of all surveyed worksites that have local area networks in service in departments outside MIS (see Chapter 2).

> What is going to happen is that end-user access to mainframes will increase. At one time, it was up to DP/MIS to get data out of the mainframe, program it, and write the reports. Now the end user has access via the micro, and all of a sudden the user knows about all this data. He or she wants it, wants to bring it down to the micro to play within a spreadsheet and incorporate it into documents. For this to happen, the end user has to know not only micros, but also mainframes—and have access to them.
>
> One of the things we have an eye on is doing more and more accessing of corporate data. We are paying a lot of attention now to the corporate data dictionaries and to standardizing things, so that everybody can access mainframe information and download it to their pcs.

> I think what we are finding is that business departments are becoming increasingly aware of the data in the corporate banks. They want to draw down the information, do some local analysis and local computations, and then make the data available beyond their work group. And I think part of the responsibility of the information center will be to help the end-user community find resources, teach them how to ask the right questions, tell them what products are available, and show them how to download the information. It'll be more of a marriage, and the information center will have to provide some heavy cross training between those people who specialize in micro technology and those involved in mainframe technology.

THE TRAINING ROLE

Training is the inescapable task imposed on the information center. As Figure 3-3 shows, virtually every infocenter has training responsibility for end-user hardware and software use, and half of them train end users in programming. Training issues are discussed in full in Chapter 4, including the tools and techniques best suited to end-user needs. Certainly, these issues are familiar ones to infocenter staffers.

> Based on the type of individual being trained, business and professional *versus* secretarial support, there are differences in terms of the information that people need to get started. I think that while those of us in the information center were excited and very inquisitive as to how these pcs work, the business professional and the secretarial professional had a job to get done and they really didn't want to understand DOS. They didn't want to understand the esoteric features of the product. They had a mission. You had to gear the training to getting them through A, B, C, and D, and then you could spend a couple of hours telling them some other things they might need to know or should know.

> We found that we needed to get into internal training. It wasn't that we were unhappy with the outside training services, but our people kept coming back and saying, "Oh, I learned a lot, but much of it wasn't specifically geared to my job."

STAFFING ISSUES: BRINGING IN THE TRAINERS

Five years of AMA research has uncovered a pattern in information center staffing. At start-up, the staff profile was heavily weighted toward MIS professionals; trainers were rarely included. This was common—and it was a mistake. Here's how the *1986 AMA Report on Information Centers* described the situation:

> A highly respected MIS manager and an early champion of personal computing speculated [in 1985] whether the new IC would be best headed by an MIS professional who had learned to train, or by a training expert who had become knowledgeable in computers. That speculation now seems prescient in light of actual practice. Only about a third of our respondents started their centers with any training person on board, but the situation changes rapidly and considerably as the center matures. By now [1986], half of all infocenters have at least one training specialist on its full-time staff, and by this time next year [that is, mid-1987], about 60 percent of all centers will have a trainer.

The present survey found that the number of infocenters with trainers on staff continues to grow, as does the number of trainers on any given staff. By the end of 1988, 73 percent of respondent ICs will have at least one trainer aboard, and 41 percent will have two or more (see Figure 3-4).

And with the growth of IC staff—the average today is 12, up from 8 in 1986—comes the addition of people who are neither MIS professionals nor trainers: administrative personnel, business specialists, or end users themselves. Eight out of ten respondent ICs reported having such "others" full-time on the infocenter staff.

While averages are instructive, the modes—that is, the most frequently reported numbers—are a better guide to "typical" staffing in a sample of 171 information centers. But even here, the modes paint a picture that is less than complete. The reported mode in each category is

Figure 3.4. Infocenter staffing, 1988.

(Pcts are of information centers responding to question)

	MIS/DP	*Trainers*	*Others*
Pct with some	95.2	73.1	79.4
Mode*	1	1	1
Pct at mode	23.8	32.1	27.9
Pct with more than one	71.4	41.0	51.5
Pct with 2	16.7	21.8	20.6
Pct with 3	11.9	9.0	14.7
Pct with 4	14.3	3.8	4.4
Pct with 5 to 9	19.0	3.8	7.4
Pct with 10 or more	9.5	2.6	4.4
AVERAGE*	6	5	2
	N = 126	N = 78	N = 68

*Note: Figure represents a numeric total, not a percentage.

one (see Figure 3-4)—but centers are more likely to report more than one staffer in each specialty. Moreover, staffing figures depend to a great extent on assigned tasks, and on whether or not such tasks are performed by full-time staffers, by others in the organization, or by outside consultants. One constant: whereas the size of the infocenter staff naturally tends to increase with the size of the workplace, the relative ratios of MIS specialists, trainers, and administrators stays the same.

The lesson, though, has been learned. With training an ever-present responsibility of the infocenter, the trainers have come on board as full-time staff in ever-growing numbers.

> I think my company has recognized that computing is here to stay, and that training for that function has to become ingrained in the corporate structure. We really needed to find people who provided training as a living, in order to handle training on a more (I hate to say it) routine basis—scheduling classes, assigning instructors, and making sure that the mix of the classroom was consistent. Even though we felt this was the best way to train our end users, there was a tremendous fear, and to some degree it is still valid, that the group that supports the product from a hotline standpoint is a step removed from the training.

INFOCENTERS AS "KEY PLAYERS"

In large and midsized organizations especially, the information center wields an authority almost equal to that of the MIS function in the purchase of microcomputer hardware and software to support end-user computing (see Figure 3-5).

We have already reviewed the matter of necessary authorizations and "key players" in the 295 firms that make up the AMA sample (see "Who Signs the Check?" in Chapter 2). Comparing data from worksites that support information centers with data from those that don't (see Figure 3-6) clearly indicates that *information center authority complements that of MIS, and is not gained at a significant expense to the MIS function.*

Comparisons of Figures 3-5 and 3-6 make the point. Certainly the MIS function suffers a decline in authority over micro purchases when an information center is present, but that decline is by no means precipitous. MIS authorization is necessary for the purchase of micro hardware at 75 percent of respondent worksites that lack infocenters; it is necessary at 66 percent of worksites that support infocenters. At small-company worksites there is no change at all; at large and midsized firms the falloff is somewhat greater, but not dramatic. MIS is identified as the "key player" in micro hardware purchases at 58 percent of worksites with no IC and at 52 percent of worksites with an IC—a 6 percent difference that is well within the range of statistical error for a sample of this size. A similar tale is told for the purchase of micro software for end users.

In fact, the figures show that the presence of an information center has greater negative impact on the purchase authority of the *end-user department* than on the authority of the MIS function. This is especially true at large and midsized firms. Nine out of 10 large firms with no infocenters require departmental authorizations for purchases of micro hardware; when an infocenter is present, the figure drops to 64 percent. Even greater differentials in departmental authority appear elsewhere in the charts.

Figure 3.5. Necessary authorization and "key player" identification for organizations *with* information centers.

		Total sample	*Organizational size*		
			Small	*Midsized*	*Large*
		%	%	%	%
Purchase of microcomputer hardware in support of end-user computing					
Necessary authorization (Pcts of those responding to question)	MIS/DP	65.9	70.0	62.8	61.5
	End-user dept	50.6	45.7	48.8	64.1
	Infocenter	36.0	18.6	51.2	51.3
	Other	11.6	14.3	9.3	7.7
"Key Player" (Pcts of those identifying "key player")	MIS/DP	51.6	62.1	45.2	41.4
	End-user dept	18.3	19.0	16.1	20.7
	Infocenter	15.9	5.2	29.0	20.7
	Other	14.3	13.8	9.7	17.2
Purchase of microcomputer software in support of end-user computing					
Necessary authorization (Pcts of those responding to question)	MIS/DP	54.9	58.6	48.8	53.8
	End-user dept	59.8	58.6	60.5	66.7
	Infocenter	35.4	18.6	51.2	48.7
	Other	10.4	12.9	9.3	7.7
"Key Player" (Pcts of those identifying "key player")	MIS/DP	44.4	56.1	33.3	34.5
	End-user dept	25.8	24.6	20.0	37.9
	Infocenter	16.1	5.3	36.7	13.8
	Other	13.7	14.0	10.0	13.8

So if there are "war stories" to be told about internecine battles, the sad tales should come not from the MIS warriors, whose authority is little affected by an infocenter "invasion." It's the department heads that bear the wounds.

SUNRISE, SUNSET

> I believe that the information center is going to be obsolete relatively quickly, and that departmental machines will take its place. To position my company for that phase, we created satellite information centers on every floor. Although not necessarily manned, the move at least put the computers with the users. We then produced directional guidelines on purchasing, vendors, supplies, and training—to make them totally self-functioning.

Ironically, it is the image of the information center as a facilitator of transition that threatens its future. Ten respondents with information centers report plans to phase out the unit: 2 will do so this year, 2 more in '89, 4 more in 1990 (the others do not report a date). Moreover, the survey identified 3 firms that once supported ICs but have since phased them out.

Figure 3.6. Necessary authorization and "key player" identification for organizations that *do not* support information centers.

		Total sample %	Organizational size Small %	 Midsized %	 Large %
Purchase of microcomputer hardware in support of end-user computing					
Necessary authorization (Pcts of those responding to question)	MIS/DP	75.0	70.6	81.3	77.8
	End-user dept	66.0	64.7	75.0	88.9
	Other	14.0	11.8	18.8	11.1
"Key Player" (Pcts of those identifying "key player")	MIS/DP	58.2	53.1	81.8	50.0
	End-user dept	22.4	22.4	18.2	50.0
	Other	19.4	24.5	0.0	0.0
Purchase of microcomputer software in support of end-user computing					
Necessary authorization (Pcts of those responding to question)	MIS/DP	66.7	61.8	66.7	77.8
	End-user dept	71.7	72.1	73.3	100.0
	Other	13.1	11.8	13.3	11.1
"Key Player" (Pcts of those identifying "key player")	MIS/DP	51.5	45.8	70.0	60.0
	End-user dept	27.3	27.1	30.0	40.0
	Other	21.2	27.1	0.0	0.0

The figures are counterbalanced by 21 respondents who do not at present have infocenters but who plan to start them up: 8 in 1988, 9 in 1989, and 4 who do not give planned start-up dates.

But it may be a matter more of nomenclature than function. The shift to departmental computing does not eliminate the need for end-user support functions—just the reverse. Although the IC may disappear as a distinct unit, information center professionals in future years will have a greater, not a lesser, voice in evaluations, authorizations, and training functions.

Some centers keep themselves alive and relevant by searching for new ways to fulfill their mission:

> We hold roundtable meetings. All the latest technology is communicated at these meetings, and I use the corporate infocenter for recommendations on specific items of technology, such as hand scanners. Then I take their recommendations and I integrate them into an actual business application. So I use them on the highest plane and then bring them down to the actual lines of business.

Call the information center what you will—change maker, facilitator, decentralizing agent, technology catalyst—the objective is clear: to facilitate the dispersion of information technology in such a way as to meet business needs. The infocenter will remain viable as long as new technology is entering the workplace and the need to facilitate its introduction exists.

4

Training: So Much to Do, So Little Time

Training is a huge problem because people buy all these software packages based on somebody's idea, nobody trains them fully, and everyone ends up knowing a little bit about each package—but no one knows enough about a package in its entirety.

THE RISE of departmental computing has introduced a third dimension into the training function, adding further complexity to a task that has already proved difficult and often only minimally effective.

Heretofore, computer training featured two levels. The first may be called *generic* training—introducing end users to basic keyboard skills and the concepts that underlie word processing, spreadsheet operations, and database management. In some cases this involves teaching elementary programming in fourth-generation languages. (One manager defined such learning as "knowing what to do when you see an A> prompt.") The second level may be termed *task-specific* training—bringing the end user to a higher skill level in specific business applications, including the use of proprietary systems unique to a particular job or worksite.

To these we may now add a third: management training. AMA's present research has been heavily guided by Gerald Hoffman's dictum, "As departmental computing becomes a reality, departmental managers become, in effect, MIS managers." In conversations with members of the Microcomputer Managers Association, we delved into the question of how departmental managers might develop the knowledge and skills necessary to these new responsibilities. Their opinions are expressed later in this chapter.

THE CHICKEN OR THE EGG

There is debate as to which of the two types of training — generic or task-specific—ought to be an end user's initial focus. One side argues the importance of bringing an end user up to speed in a particular application as soon as possible; the other insists that end users are better enabled to do such tasks if they have a taste of the technology's wider scope. Two points of view:

> It is very difficult to train someone in a workstation by just giving them LOTUS training or word processing training. What they really need is a whole gamut of information . . . We have developed what we call strategic workstation training, whereby, in about two days [in a classroom setting] you will talk about how a workstation functions within a department. And we clearly state that we do not want end users to be pc experts, because if you go to a class for LOTUS, you will not learn how to get to the host, because these things are particular to the department. . . .
>
> We have a standardized menu. Our end users need to know how to migrate from there to any particular application. Specifically, in the case of hosting relations, there is a keyboard mapping process, and end users need to know how the keys vary from a functional terminal to an IBM PC terminal or a compatible terminal.
>
> So the training is basically focusing on the complete workstation, giving a taste of everything available. If the end user wants more specific training on a particular application, there are CBT (computer-based training) modules available.

> Some people tend to feel that this approach is rather shallow, because if you give them a little bit of everything, they may not use it. . . . If it's not hands-on, but rather slides and lectures, might it not be considered just an awareness program?

TOOLS AND TECHNIQUES

Whatever the approach, training continues to be a growth industry. Training budgets among respondents rose by an average of 10 percent from 1987 to 1988 (see Figure 4-1), and the number of end users undergoing training increased by an average 33.5 percent.

Classroom instruction remains the most popular method of end-user training (see Figure 4-2). Nine out of 10 respondents used some form of classroom training in 1987 and the figure will hold in 1988. Almost as many respondents supply end users with notebooks, manuals, and cassettes for self-instruction, although the trend is downward. AMA data indicate a 4 percent decrease from 1987 to 1988 in the number of respondents using such training tools. Eight out of 10 firms will employ computer-based training tools (CBT).

Figure 4.1. Comparison of worksite end-user training budgets, 1987 and 1988.

		Organizational size			*Worksite population*		
	Total 295	*Small* 160	*Midsized* 64	*Large* 51	*−250* 139	*250–999* 98	*1000+* 57
Worksite training budget in 1987 (Average in thousands, excluding none)	$69	$51	$99	$83	$51	$45	$155
Worksite training budget in 1988 (Average in thousands, excluding none)	$76	$61	$100	$99	$62	$52	$155
Net change, 1987 to 1988	10.1%	19.6%	1.0%	19.3%	21.6%	15.6%	0.0%

Figure 4.2. Comparison of end-user training methods, 1987 and 1988.

		Organizational size			*Worksite population*		
	Total	*Small*	*Midsized*	*Large*	*−250*	*250–999*	*1000+*
1987—Percentage of respondents using:							
Manuals/cassettes	87.7	86.7	85.3	90.6	84.5	92.6	90.6
CBT	78.0	71.6	78.8	90.0	75.0	77.1	88.2
Classroom instruction	89.6	84.8	94.0	94.9	85.1	92.5	97.6
1988—Percentage of respondents using:							
Manuals/cassettes	84.2	79.7	90.3	87.5	77.1	91.1	93.3
CBT	79.1	71.8	81.8	90.0	73.6	79.1	90.9
Classroom instruction	89.4	82.3	95.7	97.4	83.0	93.4	98.1
Net change, 1987 to 1988:							
Manuals/cassettes	−4.0%	−8.1%	5.9%	−3.4%	−8.7%	−1.6%	3.0%
CBT	1.4	0.3	3.8	0.0	−1.9	2.6	3.0
Classroom instruction	−0.2	−3.0	1.8	2.7	−2.6	1.0	0.5

Computer-based training continues to display a high rate of growth (see Figure 4-3). The number of end users trained via CBT rose 58 percent from 1987 to 1988, compared with a 32 percent increase in the number of end users who underwent self-instruction with manuals or cassettes, and a 27 percent increase in the number of end users attending classroom instruction courses.

Every training program mixes and matches these tools and techniques, using each as deemed appropriate to the task being taught and the end-user population being trained. Companies arrive at the proper mix after extended periods of trial and error. Tracking end-user training since 1985, AMA has seen a common pattern: at start-up, companies facing a huge training task try every manner of instruction; then, generally within 18 months to two years, they settle in the particular tools and trainers that give the best results.

Figure 4.3. Comparison of number of end users trained by manuals/cassettes, CBT, and classroom instruction, 1987 and 1988.

		Organizational size			*Worksite population*		
	Total	*Small*	*Midsized*	*Large*	*–250*	*250–999*	*1000+*
1987—Average number of end users* trained via:							
Manuals/cassettes	37	15	49	95	16	32	104
CBT	26	11	57	39	9	26	62
Classroom instruction	92	38	144	190	38	94	227
Total	155	64	250	324	63	152	393
1988—Average number of end users* trained via:							
Manuals/cassettes	49	19	63	113	22	47	115
CBT	41	15	79	74	17	39	96
Classroom instruction	117	34	190	246	39	131	264
Total	207	68	332	433	78	217	475
Average net change, 1987 to 1988:*							
Manuals/cassettes	32.4%	26.7%	28.6%	18.9%	37.5%	46.9%	10.9%
CBT	57.7	36.4	38.6	89.7	88.9	50.0	54.5
Classroom instruction	27.2	–10.5	31.9	29.5	2.6	39.4	16.5
Total	33.5	6.3	32.8	33.6	23.8	42.8	21.0

*Averages include zero

> I find that computer-based training is really good for names and definitions, which is where you want familiarity. But productivity comes from hands-on work. We found the spreadsheet learning curve to be quite rapid—people could create their own spreadsheets after two days. Database training was quite different. We developed and still have more than five different database courses: internal database, database concepts, database programming in two days, and advanced database programming in another two days.

> I haven't seen a lot of computer-based training that I consider to be very valuable. I find that having the person in the front of the classroom, going through a very structured course outline, is fairly effective. And I have given the books to some people, and they have come back and seem to have benefited a great deal from that. So I think that it really depends on the end users—whether they are self-motivated, or whether they need to have their hands held.

> I find the financial applications, like LOTUS, are probably the most widely accepted module for CBT. The word processing people tend to find CBT cumbersome, because most professionals are not interested in underlining or boldfacing or that sort of thing, and most CBT modules address those functions. Also, the end users' questions tend to relate to the

> interface with the host or to the local area network, if one is present; and these are things for which you generally don't have a CBT module.

Growth, therefore, is not properly measured by comparing the percentage of respondents using any given training tool (Figure 4-2). Most companies use all available tools to a greater or lesser degree. Growth is best measured by the number of end users trained via each tool (Figure 4-3). Large firms, especially, have given computer-based training a resounding affirmation. They will train nearly twice as many end users via CBT in 1988 as they did in 1987. Small companies are also catching on to the economy and effectiveness of CBT: whereas small firms in the sample show a net decrease in the number of end users trained in classrooms from 1987 to 1988, they register a 36 percent increase in the number of trainees using CBT.

While trainers found that identical CBT courses would suit individuals at every level of the organization, the classroom proved a difficult setting for mixed classes of managers and hourly workers.

> The higher-level individuals do not want to participate in a classroom setting, where people can see how they are doing, so to speak. And of course we're sensitive to that, and give individualized instruction, one-to-one, in the manager's office.

> I had to keep track of how many vice presidents came to class, and there were a few times, but they were rare. They did not want to be mixed in with basic user-types. And there were scheduling problems . . . Now there is a separate course for vice presidents.

PROVIDERS

Whereas most training courses utilize materials produced by vendors of the hardware and software being used—nearly 9 out of 10 respondents reported doing so—there is a clear trend toward developing materials specifically designed for the organization or worksite, and toward delivering this courseware on-site with in-house trainers or with independent consultants. The AMA survey found a 37.5 percent increase in the number of end users trained with self-study materials developed by independent trainers, and a 30 percent increase among end users receiving classroom instruction from independents—onsite or offsite—from 1987 to 1988. (See Figure 4-4.)

> The only in-house training we do now is informal. Any formal training is done on the outside, or we bring in consultants.

> The best training we've done is the training we've managed ourselves. . . . We have a lot of people in my department who want to train in Symphony or DBase or DisplayWrite. . . . We had some standard courses that I was not pleased with. They were too generic. In order to have effective training, I think that it needs to be tailored specifically to what the end user is

Figure 4.4. Trends in courseware development and delivery.

		Organizational size			*Worksite population*		
	Total %	*Small* %	*Midsized* %	*Large* %	*−250* %	*250–999* %	*1000+* %
Net change, 1987–1988							
Number of respondents using:							
Self-instruction/materials developed in-house	6.7	16.0	5.5	2.4	8.0	2.5	6.8
Self-instruction/materials from vendors	−0.4	−0.4	2.5	−3.1	−3.5	0.7	3.3
Self-instruction/materials from ind. trainers	13.1	4.2	39.4	−0.5	10.5	11.8	−23.9
Classroom training/in-house trainers	4.7	−0.4	9.4	2.0	7.0	1.7	2.6
On-site training/ind. trainers	18.8	22.9	18.5	4.3	33.2	8.6	13.7
Off-site training/ind. trainers	3.8	6.2	10.1	−9.8	0.5	2.9	8.9
Number of end-users trained via:							
Self-instruction/materials developed in-house	27.6	61.5	33.3	20.8	17.9	69.4	18.2
Self-instruction/materials from vendors	17.1	−19.2	36.5	37.0	52.9	−16.3	23.6
Self-instruction/materials from ind. trainers	37.5	−12.5	51.8	47.7	38.9	63.6	12.3
Classroom training/in-house trainers	15.6	−10.9	10.1	29.9	−7.7	36.7	11.6
On-site training/ind. trainers	30.0	3.7	65.8	27.9	−26.3	105.3	36.9
Off-site training/ind. trainers	28.6	8.3	42.3	56.4	0.0	30.0	31.9

> doing, with examples that relate to things that we deal with—the classic payroll examples, for instance. And in retrospect, I would not do it any differently. People said, "Oh, I can see how I could put that to use tomorrow," instead of saying, "Oh, I understand the concept, but I don't know whether I will ever use it."

> Doing our own courses in-house was the only way to go. We do all the manuals in-house. When pcs came in, people in the corporate area were struggling. They didn't have pcs themselves; they couldn't teach the expertise; and we couldn't allocate an official budget for training, because we were not a training group. But everybody looked the other way because there were so many people going outside to get training; and quite frankly, the corporate people could not keep pace with the demand.
>
> So we evolved a very successful training operation that trained 950 people in the first year—successful because we used our own examples, LOTUS examples . . . . We found that our people were reluctant to be identified as trainers, so we ended up hiring consultants to teach our own in-house courses, and they became like staff.

SHARING THE JOB

By its very nature, end-user training is a concern of more than one department. An individual's computer training matters to his or her own department and to the human resources department; the nature of the training matters to the MIS department, and to end-user assistance units, called the "information center." By policy, training is a shared responsibility at 27.5 percent of respondent worksites.

As Figure 4-5 demonstrates, MIS has the greatest say in the matter, although at large-company worksites the information center's responsibility exceeds that of MIS. Training at small companies is more likely to be a "catch-as-catch-can" affair; in addition to the 10.3 percent who told AMA that there is no assigned responsibility for end-user training, 9 percent of the small firms gave no response at all to this query—while all the large companies answered it.

NURTURING THE "GOLD COLLAR" WORKER

> The end-user manager has to become more computer literate. People keep on talking about computers as being the answer, and they are not the answer. They are a way to get to the answer. So people will have to learn some new management skills. They'll have to learn how to manage technology.

A resonant phrase permeated the roundtable discussions with members of the Microcomputer Managers Association: the "gold collar" worker." Simply defined, the gold-collar worker is "the worker who can combine a knowledge of technology with a knowledge of the business side,"

The concept evoked discussion on a wide range of issues. How much expertise in computer operations ought business managers to have? Whose job is it to train these managers—not in keyboard skills, but rather in the science of information management? How is the job best done? Real debate ensued as the working micromanagers around the table took positions on different sides of each issue.

First, there were questions of definition. Was the gold-collar worker a "power user" in a new incarnation? Perhaps that was where to start.

Figure 4.5. What departments have responsibility for end-user training?

		Organizational size			*Worksite population*		
	Total %*	*Small* %*	*Midsized* %*	*Large* %*	*−250* %*	*250–999* %*	*1000+* %*
MIS/DP	73.9	76.0	73.8	66.7	74.2	71.6	76.8
Human resources	14.1	8.9	13.1	27.5	5.6	17.9	26.8
End-user dept	36.2	35.6	32.8	37.3	33.1	35.8	42.9
**Infocenter	42.1	22.7	47.7	72.5	26.1	46.7	63.4
Other	7.6	7.5	9.8	7.8	7.3	9.5	5.4
None assigned	7.2	10.3	6.6	2.0	8.9	8.4	1.8

*Percentages are of companies responding to question.
**Percentages are of respondents with information centers.
(Percentages exceed 100 where responsibility is shared among departments.)

> The way it usually works is that the power user, the one who is most pc literate and who really knows how to make the computer sit up and sing, becomes the liaison between the department and MIS. But that person does not understand methodology, doesn't understand the problem. And then you are perpetuating the situation. You are never really getting someone trained in the most effective way to solve a problem.

> As far as I'm concerned, the gold-collar worker would be the person who goes out to look for new tools, grabs things, finds out things. It's the person who uses the tools he has, who understands that there are other tools out there that he can get to, in order to get the information he needs—from one source or another—in the shortest amount of time, and who knows how to use that information.

But computer literacy is only a start. What is essential to the gold-collar worker is not so much an ability to "make the computer sing" as it is a conceptual insight, an understanding of how information technology can be applied to the business problem at hand.

> I don't see where the gold-collar worker is going to be your fourth-generation programmer. Maybe I am being a bit short-sighted, but currently I don't see end users needing that. I can't say that I see many of my users developing that, even my power users . . . . The advanced computing skills you are giving your power users, your potential gold-collar workers, are decision support systems, graphics-type systems, research tools. They need information at their fingertips. Do they need to program that application? I would question that.

So the need is not for managers who know how to program; it is for managers who know that a program can be written to solve a business problem. Participants were concerned that departmental managers who have come to depend on computer operations know so little about their configuration and cost.

> People tend not to understand the actual total costs of these systems. They pay $500 for a software package, and $200 for training, and they figure that's it. But this is not true. To get the package running, you need some diskettes. You need to have a new machine running, and running at all times, and available. So the real cost of the device is often five or six times what you pay out.

> As technology progresses, it becomes much more expensive. Five years ago, it was nice to be able to have a workstation to do spreadsheets or word processing. And we felt that would alleviate the number of memos that were typed or sent out to the typing pool, or reduce the head count of people.
>
> From here on in, though, effectiveness is going to cost much more. Because you now have to worry about distributive processing. You have to develop a system with an MIS group that knows what you want to be able to do, a system that lets the end user or the departmental machine do it. And to put that technology in place, you need some infrastructure to support it, and that is expensive.

And cost judgments are just the beginning. A working knowledge of what's going on inside the machines can also lend perspective to the departmental manager.

> Managers of end-user departments would have to have some degree of understanding of data processing. I did software development for the mainframe for 15 years, and I don't think I could have begun to understand the problems that people are facing in terms of bringing in the technology if I didn't have a concept of how data processing really works, or how information systems work in general. And I would think that departmental managers need to have that sort of perspective in order to manage the technology in a more effective and cost-efficient manner.

> I think there are three different things you have to speak to. You have to talk about the management of technology and computers. You have to talk about the technical skills. And then you have to talk about the methodology itself. After an organization gets past the point of everyone knowing LOTUS, you want to have people developing applications that can be shared by other people, that are consistent, that will outlive that person's life in the organization. And once you get to that point, you have to develop some methodology as well.
>
> I see us looking at things from a larger perspective. First put everybody through all the training that you can, and then afterwards step back and say, "How can we make some sense out of this?" Go through the whole life cycle, and start getting some effectiveness in the training you do, not just efficiency.

And who is to supply the departmental manager with such knowledge? This is where the microcomputer manager or the information center manager feels the tug of responsibility.

> Where is the boundary between knowing and being a computer guru? Does a manager have to know about product? Must he critique his people on their use of it? Does he need to know about pricing, about updates?
>
> [*Response:*] I think it is our job, critically our job, to determine what he needs to know. He has to be warned that computer output should be reviewed in the same fashion that you review any number or stock figure.

Responsibility is the key. When budgets are configured on a LOTUS spreadsheet, the departmental manager becomes responsible not only for the figures, but also for the program that worked them up. The advent of the computer does not relieve the manager from seeing that the numbers are right.

> I think the manager should be responsible for seeing whether a spreadsheet is correct, whether a template is correct. If they produce the wrong results, it's the manager's job to see that. And he has to have experience in whatever products are being used. He doesn't necessarily have to be the guru, but he has to make sure.

> What was the level of responsibility before the computer was rolled in? I'm sure that responsibility extended to the credibility of the data. That responsibility has not gone away.

> Managers have to ask, "Do I take this at face value? Do I need to ask for backup material? How critical is this information to the product? Is it going to make or break the product if this information is wrong?" There is a balance to be reached, as it had to be reached before computers ever came into the business.

Of course, a departmental manager cannot review the processes by which every end user in the department creates every spreadsheet. But the manager can insist on computer literacy and include computer expertise when reviewing an employee's performance.

> It is a start for a manager to recognize that computer literacy is a performance need. We just got them to put that on the performance report. All staff are now evaluated on their technical skills and on their knowledge of hardware and software. It's a start.

To develop such skills, workers need training. To develop the ability to review those skills, senior managers need training as well—a specialized kind of training that goes beyond keyboard skills to encompass the wider capabilities of the machines themselves.

> Until we come up with the training courses and the tools that allow a manager to review the output, we are losing that piece of technology.

> We have a senior executive training program now. It was a very expensive thing to put together. Execs go offsite for a couple of days to discuss managing technology and also do some hands-on keyboarding so that they feel a little more literate. We have a lot of different databases that we connect to, and people do not really appreciate that. So we introduce them to that, and to some of the mainframe packages that we have.
>
> But for the most part, we try to break down the mystique. We have a machine that we take apart at the training session. It costs $10,000 each time to have it put back together. But we enter a financial statement on some spreadsheets, and we have the execs go through exercises—what would happen if they up one figure by 5 percent, what would be the impact on the other numbers. And at that level it really strikes home, because these guys are dealing with the numbers, massaging them again and again and again, to try to decide an optimal mix of gains and losses.
>
> They come back all charged up, because they see how computers actually can be used in the organization. And they try to impart that insight to each specific area.

With such training, departmental managers may begin to attack long-standing problems of MIS backlog. Independent of the centralized data processing unit, they can enable their own people to solve business problems with suitable information technology. Independent of headquarters, they can empower subsidiary or branch offices to work out their own solutions.

> Systems departments can grow only so rapidly. As they get bigger, they have to set priorities within their organization. They cannot keep on adding a couple of hundred people a year—eventually they'd be bigger than the rest of the organization. So they'll pick and choose a few things—and what's going to happen to everyone else?
>
> As a result, other groups will fend for themselves. If they do not develop some sort of MIS

> management capability within their departments, they are not going to be automated at all. And they are going to feel left behind.

> What about all the end users spread out across the country? Just because of the fact that they are located hundreds and thousands of miles away from headquarters, and are using advanced technology and fairly sophisticated equipment, they are forced to become self-sufficient in order to keep up. So we are fostering computer sophistication in the outposts.

This comment prompted a rhetorical question: "Have they become self-sufficient, or merely inadequate?"

That last response is an indication that departmental empowerment is not all that simple. There are problems of authority, of protected turf, of suspicion at both the highest and lowest levels of management. Overcoming these obstacles is never easy, but making the attempt is crucial.

> Before we can foster the acceptance of a gold-collar worker in the work group, the value of such a worker has to be recognized. If we could provide a module to somehow enlighten executive vice presidents as to the benefit of the gold-collar worker, that would be a very good recipe.

> I think there are a lot of politics, especially at the lower levels, when you get into managers who are very turf oriented. I think that to have a true gold-collar worker, there is probably going to be to be a partial reversal of that, so that you can go from the bottom up. Because solutions have come be from the people who are actually using the technology, who have the ideas, who are entrepreneurs in the corporation.

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Appendix

Chart 1

1988 AMA REPORT ON END-USER COMPUTING

SECTION 1: ABOUT YOUR ORGANIZATION

ORGANIZATIONS'S TOTAL SALES (BUDGET) FOR 1987

		ANNUAL SALES			BUSINESS CATEGORY			WORKSITE POPULATION					WORKSITE DESCRIPTION		
	TOTAL	LESS THAN $100 MIL-LION	$100 TO $500 MIL-LION	MORE THAN $500 MIL-LION	MANU-FACT-URER	SER-VICE PRO-VIDER	OTHER	FEWER THAN 250	250 TO 999	1000 TO 2499	2500 TO 5000	OVER 5000	CORP-ORATE HEAD QUARTERS MULTI-UNIT ORGANI-ZATION	DIVISION SUB-SIDIARY BRANCH LARGER ORGANI-ZATION	ORGANI-ZATION WITH ALL MAJOR UNITS IN ONE LOCATION
BASE- TOTAL RESPONDENTS	295	160	64	51	100	119	46	139	98	43	8	6	120	93	77
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
LESS THAN $100 MILLION	160	160			55	70	25	104	45	10			54	45	57
	54.2	100.0			55.0	58.8	54.3	74.8	45.9	23.3			45.0	48.4	74.0
$100- $500 MILLION	64		64		25	25	12	16	28	17	2	1	28	24	12
	21.7		100.0		25.0	21.0	26.1	11.5	28.6	39.5	25.0	16.7	23.3	25.8	15.6
MORE THAN $500 MILLION	51			51	18	23	5	10	21	11	5	4	33	16	2
	17.3			100.0	18.0	19.3	10.9	7.2	21.4	25.6	62.5	66.7	27.5	17.2	2.6
NOT REPORTED	20				2	1	4	9	4	5	1	1	5	8	6
	6.8				2.0	.8	8.7	6.5	4.1	11.6	12.5	16.7	4.2	8.6	7.8

Chart 2

1988 AMA REPORT ON END-USER
COMPUTING

ORGANIZATION'S PRIMARY PRODUCT OR SERVICE

SECTION 1: ABOUT YOUR ORGANIZATION

		ANNUAL SALES			BUSINESS CATEGORY			WORKSITE POPULATION					WORKSITE DESCRIPTION		
	TOTAL	LESS THAN $100 MIL-LION	$100 TO $500 MIL-LION	MORE THAN $500 MIL-LION	MANU-FACT-URER	SER-VICE PRO-VIDER	OTHER	FEWER THAN 250	250 TO 999	1000 TO 2499	2500 TO 5000	OVER 5000	CORP-ORATE HEAD QUARTERS MULTI-UNIT ORGANI-ZATION	DIVISION SUB-SIDIARY BRANCH LARGER ORGANI-ZATION	ORGANI-ZATION WITH ALL MAJOR UNITS IN ONE LOCATION
BASE- TOTAL RESPONDENTS	295	160	64	51	100	119	46	139	98	43	8	6	120	93	77
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
BANKING AND FINANCE FINANCIAL INVESTMENT SERVICES	27	10	3	7		14	2	13	3	6	3	2	11	6	8
	9.2	6.3	4.7	13.7		11.8	4.3	9.4	3.1	14.0	37.5	33.3	9.2	6.5	10.4
COMMUNICATIONS PUBLISHING	9	2	2	3	2	2	1	3	4	1	1		4	3	2
	3.1	1.3	3.1	5.9	2.0	1.7	2.2	2.2	4.1	2.3	12.5		3.3	3.2	2.6
DIVERSIFIED CONGLOMERATE	1			1			1		1				1		
	.3			2.0			2.2		1.0				.8		
EDUCATION	12	10	2			8	4	7	2	3			3	6	3
	4.1	6.3	3.1			6.7	8.7	5.0	2.0	7.0			2.5	6.5	3.9
ELECTRONICS															
ENTERTAINMENT/RECREATION LODGING	5	1	2	2		1	2	1	1	3			4		1
	1.7	.6	3.1	3.9		.8	4.3	.7	1.0	7.0			3.3		1.3
FOOD PROCESSING AGRIBUSINESS	8	5	3		4	2	1	5	3				5		3
	2.7	3.1	4.7		4.0	1.7	2.2	3.6	3.1				4.2		3.9
GOVERNMENT/MILITARY	23	11	7	2		9	9	8	9	5	1		9	4	10
	7.8	6.9	10.9	3.9		7.6	19.6	5.8	9.2	11.6	12.5		7.5	4.3	13.0
HEALTH CARE/MEDICAL SERVICES	17	10	6			13	2	11	2	4			9	1	7
	5.8	6.3	9.4			10.9	4.3	7.9	2.0	9.3			7.5	1.1	9.1
INSURANCE	11	2	2	7		10	1	3	1	6	1		6	3	2
	3.7	1.3	3.1	13.7		8.4	2.2	2.2	1.0	14.0	12.5		5.0	3.2	2.6
MANUFACTURING CONSUMER GOODS	11	5	2	4	11			4	7				5	3	3
	3.7	3.1	3.1	7.8	11.0			2.9	7.1				4.2	3.2	3.9
MANUFACTURING INDUSTRIAL BUSINESS-TO-BUSINESS GOODS	79	44	21	13	77	1	1	31	37	7	2	2	23	39	17
	26.8	27.5	32.8	25.5	77.0	.8	2.2	22.3	37.8	16.3	25.0	33.3	19.2	41.9	22.1
MINERAL EXTRACTION PROCESSING	1		1		1				1				1		
	.3		1.6		1.0				1.0				.8		
PROFESSIONAL SERVICES GENERAL	26	20	4	2		23	3	15	9	2			11	9	6
	8.8	12.5	6.3	3.9		19.3	6.5	10.8	9.2	4.7			9.2	9.7	7.8
PROFESSIONAL SERVICES COMPUTER HARDWARE SOFTWARE TRAINING	13	11	1	1		10	3	11	2				3	8	1
	4.4	6.9	1.6	2.0		8.4	6.5	7.9	2.0				2.5	8.6	1.3
TRADE- WHOLESALE	3	2				1	2	3							3
	1.0	1.3				.8	4.3	2.2							3.9
TRADE- RETAIL	7	3	1	2		1	6	2	5				6		1
	2.4	1.9	1.6	3.9		.8	13.0	1.4	5.1				5.0		1.3
TRANSPORTATION DISTRIBUTION	8	5	1	2		6	2	5	3				3	2	3
	2.7	3.1	1.6	3.9		5.0	4.3	3.6	3.1				2.5	2.2	3.9
UTILITIES	8	2	3	3		6	2	1	5	1		1	4	1	3
	2.7	1.3	4.7	5.9		5.0	4.3	.7	5.1	2.3		16.7	3.3	1.1	3.9
OTHER	11	8	2			7	4	3	1	1			4	4	3
	3.7	5.0	3.1			3.9	8.7	6.5	1.0	2.3			3.3	4.3	3.9
NOT REPORTED	15	9	1	2	5	5		7	2	4		1	8	4	1
	5.1	5.6	1.6	3.9	5.0	4.2		5.0	2.0	9.3		16.7	6.7	4.3	1.3

Chart 3

NUMBER OF MACHINES AT WORKSITE (CURRENT)
* STANDALONE PCS/USZRS *

		ANNUAL SALES			BUSINESS CATEGORY			WORKSITE POPULATION					WORKSITE DESCRIPTION		
	TOTAL	LESS THAN $100 MIL-LION	$100 TO $500 MIL-LION	MORE THAN $500 MIL-LION	MANU-FACT-URER	SER-VICE PRO-VIDER	OTHER	FEWER THAN 250	250 TO 999	1000 TO 2499	2500 TO 5000	OVER 5000	CORP-ORATE HEAD QUARTERS MULTI-UNIT ORGANI-ZATION	DIVISION SUB-SIDIARY BRANCH LARGER ORGANI-ZATION	ORGANI-ZATION WITH ALL MAJOR UNITS IN ONE LOCATION
BASE- TOTAL RESPONDENTS	295 100.0	160 100.0	64 100.0	51 100.0	100 100.0	119 100.0	46 100.0	139 100.0	98 100.0	43 100.0	8 100.0	6 100.0	120 100.0	93 100.0	77 100.0
NONE	20 6.8	15 9.4	1 1.6	1 2.0	3 3.0	10 8.4	3 6.5	16 11.5	1 1.0	2 4.7			5 4.2	7 7.5	7 9.1
1-2	23 7.8	18 11.3		1 2.0	5 5.0	6 5.0	7 15.2	20 14.4	3 3.1				3 2.5	7 7.5	12 15.6
3-4	25 8.5	22 13.8	1 1.6	2 3.9	14 14.0	8 6.7	2 4.3	19 13.7	6 6.1				9 7.5	5 5.4	10 13.0
5-9	46 15.6	34 21.3	6 9.4	3 5.9	17 17.0	17 14.3	9 19.6	26 18.7	18 18.4	2 4.7			25 20.8	10 10.8	11 14.3
10-24	58 19.7	31 19.4	14 21.9	9 17.6	28 28.0	22 18.5	4 8.7	33 23.7	15 15.3	8 18.6	1 12.5	1 16.7	22 18.3	26 28.0	10 13.0
25-49	38 12.9	17 10.6	12 18.8	7 13.7	14 14.0	14 11.8	7 15.2	15 10.8	15 15.3	6 14.0	1 12.5	1 16.7	17 14.2	12 12.9	9 11.7
50 OR MORE	79 26.8	20 12.5	28 43.8	28 54.9	18 18.0	39 32.8	13 28.3	9 6.5	38 38.8	23 53.5	5 62.5	4 66.7	38 31.7	22 23.7	18 23.4
NOT REPORTED	6 2.0	3 1.9	2 3.1		1 1.0	3 2.5	1 2.2	1 .7	2 2.0	2 4.7	1 12.5		1 .8	4 4.3	
AVERAGE NUMBER (INCLUDING NONE)	63	24	94	146	36	87	40	14	61	142	464	237	80	59	46
STANDARD DEVIATION	143	53	158	215	64	183	63	20	84	192	388	345	173	134	90
STANDARD ERROR	8.4	4.2	20.0	30.1	6.5	17.0	9.4	1.7	8.6	30.0	146.6	140.8	15.9	14.2	10.3
AVERAGE NUMBER (EXCLUDING NONE)	68	27	95	149	37	96	43	16	62	150	464	237	83	64	50
STANDARD DEVIATION	147	55	159	216	65	189	64	20	84	194	388	345	177	139	94
STANDARD ERROR	8.9	4.6	20.3	30.5	6.6	18.3	9.9	1.8	8.6	31.0	146.6	140.8	16.5	15.3	11.2

Chart 4

1988 AMA REPORT ON END-USER COMPUTING

SECTION 2: DEPARTMENTAL COMPUTING

NUMBER OF MACHINES AT WORKSITE (CURRENT)
* LINKED PCS/USERS *

		ANNUAL SALES			BUSINESS CATEGORY			WORKSITE POPULATION					WORKSITE DESCRIPTION		
	TOTAL	LESS THAN $100 MILLION	$100 TO $500 MILLION	MORE THAN $500 MILLION	MANUFACTURER	SERVICE PROVIDER	OTHER	FEWER THAN 250	250 TO 999	1000 TO 2499	2500 TO 5000	OVER 5000	CORP-CRATE HEAD QUARTERS MULTI-UNIT ORGANIZATION	DIVISION SUBSIDIARY BRANCH LARGER ORGANIZATION	ORGANIZATION WITH ALL MAJOR UNITS IN ONE LOCATION
BASE- TOTAL RESPONDENTS	295	160	64	51	100	119	46	139	98	43	8	6	120	93	77
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
NONE	112	83	15	8	42	41	18	68	34	8	1		37	31	42
	38.0	51.9	23.4	15.7	42.0	34.5	39.1	48.9	34.7	18.6	12.5		30.8	33.3	54.5
1-2	23	10	7	3	6	10	6	12	8	2	1		9	6	7
	7.8	6.3	10.9	5.9	6.0	8.4	13.0	8.6	8.2	4.7	12.5		7.5	6.5	9.1
3-4	15	10	3	2	4	8	2	8	5	2			10	2	3
	5.1	6.3	4.7	3.9	4.0	6.7	4.3	5.8	5.1	4.7			8.3	2.2	3.9
5-9	31	16	7	6	14	11	3	20	7	1		3	17	10	4
	10.5	10.0	10.9	11.8	14.0	9.2	6.5	14.4	7.1	2.3		50.0	14.2	10.8	5.2
10-24	42	15	13	11	14	18	6	12	19	8	1	2	16	19	7
	14.2	9.4	20.3	21.6	14.0	15.1	13.0	8.6	19.4	18.6	[illegible].5	33.3	13.3	20.4	9.1
25-49	14	6	3	5	6	4	4	6	6	2			8	4	1
	4.7	3.8	4.7	9.8	6.0	3.4	8.7	4.3	6.1	4.7			6.7	4.3	1.3
50 OR MORE	39	10	10	14	6	18	6	5	13	17	3	1	19	12	8
	13.2	6.3	15.6	27.5	6.0	15.1	13.0	3.6	13.3	39.5	37.5	16.7	15.8	12.9	10.4
NOT REPORTED	19	10	6	2	8	9	1	8	6	3	2		4	9	5
	6.4	6.3	9.4	3.9	8.0	7.6	2.2	5.8	6.1	7.0	25.0		3.3	9.7	6.5
AVERAGE NUMBER (INCLUDING NONE)	31	10	45	80	11	39	43	8	22	91	269	24	42	20	26
STANDARD DEVIATION	107	23	145	183	22	130	155	17	51	193	371	34	130	42	119
STANDARD ERROR	6.4	1.9	19.0	26.1	2.3	12.3	23.2	1.5	5.3	30.5	131.4	13.9	12.0	4.5	14.1
AVERAGE NUMBER (EXCLUDING NONE)	52	21	60	95	20	62	72	16	35	114	322	24	62	32	62
STANDARD DEVIATION	135	32	165	196	27	159	196	23	61	210	385	34	153	49	179
STANDARD ERROR	10.5	3.9	25.2	30.7	3.9	19.2	37.7	2.9	8.0	37.1	172.2	13.9	17.3	6.7	32.7

Chart 5

1988 AMA REPORT ON END-USER COMPUTING

SECTION 2: DEPARTMENTAL COMPUTING

NUMBER OF MACHINES AT WORKSITE (CURRENT)
* TERMINALS/USERS *

		ANNUAL SALES			BUSINESS CATEGORY			WORKSITE POPULATION					WORKSITE DESCRIPTION		
	TOTAL	LESS THAN $100 MIL-LION	$100 TO $500 MIL-LION	MORE THAN $500 MIL-LION	MANU-FACT-URER	SER-VICE PRO-VIDER	OTHER	FEWER THAN 250	250 TO 999	1000 TO 2499	2500 TO 5000	OVER 5000	CORP-ORATE HEAD QUARTERS MULTI-UNIT ORGANI-ZATION	DIVISION SUB-SIDIARY BRANCH LARGER ORGANI-ZATION	ORGANI-ZATION WITH ALL MAJOR UNITS IN ONE LOCATION
BASE- TOTAL RESPONDENTS	295	160	64	51	100	119	46	139	98	43	8	6	120	93	77
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
NONE	40	20	7	10	13	21	4	17	14	6	2	1	16	16	8
	13.6	12.5	10.9	19.6	13.0	17.6	8.7	12.2	14.3	14.0	25.0	16.7	13.3	17.2	10.4
1-2	7	6		1	2	3	2	5	2				1	3	3
	2.4	3.8		2.0	2.0	2.5	4.3	3.6	2.0				.8	3.2	3.9
3-4	19	11	3	2	2	12	4	15	3	1			8	6	5
	6.4	6.9	4.7	3.9	2.0	10.1	8.7	10.8	3.1	2.3			6.7	6.5	6.5
5-9	22	17	3	2	9	8	3	15	5	2			8	7	7
	7.5	10.6	4.7	3.9	9.0	6.7	6.5	10.8	5.1	4.7			6.7	7.5	9.1
10-24	45	35	3	3	19	15	7	31	12	1		1	16	12	16
	15.3	21.9	4.7	5.9	19.0	12.6	15.2	22.3	12.2	2.3		16.7	13.3	12.9	20.8
25-49	35	28	4	2	14	14	3	24	9			1	15	9	10
	11.9	17.5	6.3	3.9	14.0	11.8	6.5	17.3	9.2			16.7	12.5	9.7	13.0
50 OR MORE	118	41	39	30	39	42	21	30	51	29	5	3	53	35	28
	40.0	25.6	60.9	58.8	39.0	35.3	45.7	21.6	52.0	67.4	62.5	50.0	44.2	37.6	36.4
NOT REPORTED	9	2	5	1	2	4	2	2	2	4	1		3	5	
	3.1	1.3	7.8	2.0	2.0	3.4	4.3	1.4	2.0	9.3	12.5		2.5	5.4	
AVERAGE NUMBER (INCLUDING NONE)	98	37	135	217	71	105	79	35	78	278	351	433	121	85	81
STANDARD DEVIATION	192	61	177	308	134	214	111	60	94	313	418	435	232	170	141
STANDARD ERROR	11.3	4.9	23.1	43.6	13.5	20.0	16.7	5.2	9.6	50.2	157.9	177.8	21.5	18.2	16.1
AVERAGE NUMBER (EXCLUDING NONE)	114	43	153	271	82	128	86	40	91	328	491	519	140	104	90
STANDARD DEVIATION	202	63	182	323	141	231	114	63	96	316	419	428	244	183	146
STANDARD ERROR	12.9	5.4	25.2	51.0	15.3	23.8	18.0	5.7	10.6	55.1	187.6	191.4	24.3	21.6	17.6

Chart 6

1988 AMA REPORT ON END-USER COMPUTING

SECTION 2: DEPARTMENTAL COMPUTING

NUMBER OF MACHINES AT WORKSITE (PROJECTED)
* STANDALONE PCS/USERS *

		ANNUAL SALES			BUSINESS CATEGORY			WORKSITE POPULATION					WORKSITE DESCRIPTION		
	TOTAL	LESS THAN $100 MILLION	$100 TO $500 MILLION	MORE THAN $500 MILLION	MANUFACTURER	SERVICE PROVIDER	OTHER	FEWER THAN 250	250 TO 999	1000 TO 2499	2500 TO 5000	OVER 5000	CORPORATE HEAD QUARTERS MULTI-UNIT ORGANIZATION	DIVISION SUBSIDIARY BRANCH LARGER ORGANIZATION	ORGANIZATION WITH ALL MAJOR UNITS IN ONE LOCATION
BASE- TOTAL RESPONDENTS	295	160	64	51	100	119	46	139	98	43	8	6	120	93	77
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
NONE	25	16	2	3	7	10	3	17	3	4			8	9	7
	8.5	10.0	3.1	5.9	7.0	8.4	6.5	12.2	3.1	9.3			6.7	9.7	9.1
1-2	23	20		1	7	8	6	20	3				3	5	15
	7.8	12.5		2.0	7.0	6.7	13.0	14.4	3.1				2.5	5.4	19.5
3-4	16	14	1	1	8	3	3	13	3				8	4	4
	5.4	8.8	1.6	2.0	8.0	2.5	6.5	9.4	3.1				6.7	4.3	5.2
5-9	25	20	2	1	11	8	4	18	7				11	4	9
	8.5	12.5	3.1	2.0	11.0	6.7	8.7	12.9	7.1				9.2	4.3	11.7
10-24	61	37	10	10	22	26	8	32	20	6	1	2	30	20	11
	20.7	23.1	15.6	19.6	22.0	21.8	17.4	23.0	20.4	14.0	12.5	33.3	25.0	21.5	14.3
25-49	35	12	15	5	15	14	4	16	13	5	1		13	16	6
	11.9	7.5	23.4	9.8	15.0	11.8	8.7	11.5	13.3	11.6	12.5		10.8	17.2	7.8
50 OR MORE	84	25	29	28	18	41	15	12	39	24	5	4	39	24	20
	28.5	15.6	45.3	54.9	18.0	34.5	32.6	8.6	39.8	55.8	62.5	66.7	32.5	25.8	26.0
NOT REPORTED	26	16	5	2	12	9	3	11	10	4	1		8	11	5
	8.8	10.0	7.8	3.9	12.0	7.6	6.5	7.9	10.2	9.3	12.5		6.7	11.8	6.5
AVERAGE NUMBER (INCLUDING NONE)	77	28	113	176	43	105	48	17	75	180	480	251	92	74	59
STANDARD DEVIATION	160	62	184	228	76	203	68	25	106	219	389	343	184	156	120
STANDARD ERROR	9.7	5.2	23.9	32.6	8.1	19.4	10.4	2.2	11.3	35.1	147.3	140.2	17.4	17.2	14.1
AVERAGE NUMBER (EXCLUDING NONE)	85	32	117	188	47	116	52	20	78	200	480	251	99	83	65
STANDARD DEVIATION	166	65	186	230	78	210	69	26	107	223	389	343	190	163	125
STANDARD ERROR	10.6	5.7	24.6	34.0	8.7	21.0	11.0	2.4	11.6	37.7	147.3	140.2	18.6	19.1	15.5

Chart 7

NUMBER OF MACHINES AT WORKSITE (PROJECTED)
* LINKED PCS/USERS *

		ANNUAL SALES			BUSINESS CATEGORY			WORKSITE POPULATION					WORKSITE DESCRIPTION		
	TOTAL	LESS THAN $100 MIL-LION	$100 TO $500 MIL-LION	MORE THAN $500 MIL-LION	MANU-FACT-URER	SER-VICE PRO-VIDER	OTHER	FEWER THAN 250	250 TO 999	1000 TO 2499	2500 TO 5000	OVER 5000	CORP-ORATE HEAD QUARTERS MULTI-UNIT ORGANI-ZATION	DIVISION SUB-SIDIARY BRANCH LARGER ORGANI-ZATION	ORGANI-ZATION WITH ALL MAJOR UNITS IN ONE LOCATION
BASE- TOTAL RESPONDENTS	295 100.0	160 100.0	64 100.0	51 100.0	100 100.0	119 100.0	46 100.0	139 100.0	98 100.0	43 100.0	8 100.0	6 100.0	120 100.0	93 100.0	77 100.0
NONE	92 31.2	71 44.4	9 14.1	7 13.7	37 37.0	32 26.9	14 30.4	57 41.0	29 29.6	5 11.6			28 23.3	26 28.0	36 46.8
1-2	18 6.1	8 5.0	5 7.8	2 3.9	6 6.0	4 3.4	7 15.2	9 6.5	8 8.2	1 2.3			8 6.7	5 5.4	5 6.5
3-4	13 4.4	8 5.0	4 6.3	1 2.0	5 5.0	7 5.9	1 2.2	8 5.8	2 2.0	3 7.0			5 4.2	5 5.4	3 3.9
5-9	34 11.5	16 10.0	11 17.2	6 11.8	10 10.0	17 14.3	5 10.9	23 16.5	7 7.1	1 2.3	1 12.5	2 33.3	19 15.8	9 9.7	6 7.8
10-24	36 12.2	22 13.8	7 10.9	6 11.8	17 17.0	14 11.8	3 6.5	15 10.8	17 17.3	3 7.0	1 12.5		15 12.5	11 11.8	10 13.0
25-49	24 8.1	9 5.6	8 12.5	6 11.8	10 10.0	9 7.6	3 6.5	9 6.5	10 10.2	3 7.0	1 12.5	1 16.7	10 8.3	9 9.7	4 5.2
50 OR MORE	61 20.7	18 11.3	15 23.4	23 45.1	10 10.0	29 24.4	10 21.7	11 7.9	19 19.4	24 55.8	4 50.0	3 50.0	30 25.0	21 22.6	10 13.0
NOT REPORTED	17 5.8	8 5.0	5 7.8		5 5.0	7 5.9	3 6.5	7 5.0	6 6.1	3 7.0	1 12.5		5 4.2	7 7.5	3 3.9
AVERAGE NUMBER (INCLUDING NONE)	58	17	81	139	16	82	55	12	36	171	457	192	79	50	36
STANDARD DEVIATION	173	41	223	266	30	227	163	23	71	293	472	361	207	158	125
STANDARD ERROR	10.4	3.3	29.0	37.3	3.1	21.4	24.8	2.0	7.4	46.3	178.5	147.6	19.3	17.0	14.6
AVERAGE NUMBER (EXCLUDING NONE)	86	32	96	161	27	115	81	21	53	195	457	192	104	72	70
STANDARD DEVIATION	206	52	239	280	34	261	193	28	81	305	472	361	233	185	168
STANDARD ERROR	15.1	5.7	33.8	42.3	4.5	29.2	35.9	3.3	10.2	51.7	178.5	147.6	25.0	23.8	27.3

Chart 8

NUMBER OF MACHINES AT WORKSITE (PROJECTED)
* TERMINALS/USERS *

		ANNUAL SALES			BUSINESS CATEGORY			WORKSITE POPULATION					WORKSITE DESCRIPTION		
	TOTAL	LESS THAN $100 MILLION	$100 TO $500 MILLION	MORE THAN $500 MILLION	MANUFACTURER	SERVICE PROVIDER	OTHER	FEWER THAN 250	250 TO 999	1000 TO 2499	2500 TO 5000	OVER 5000	CORPORATE HEAD QUARTERS MULTI-UNIT ORGANIZATION	DIVISION SUBSIDIARY BRANCH LARGER ORGANIZATION	ORGANIZATION WITH ALL MAJOR UNITS IN ONE LOCATION
BASE- TOTAL RESPONDENTS	295	160	64	51	100	119	46	139	98	43	8	6	120	93	77
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
NONE	32	19	2	8	9	17	4	21	5	3	2	1	15	12	5
	10.8	11.9	3.1	15.7	9.0	14.3	8.7	15.1	5.1	7.0	25.0	16.7	12.5	12.9	6.5
1-2	6	5		1	2	2	2	4	2					3	3
	2.0	3.1		2.0	2.0	1.7	4.3	2.9	2.0					3.2	3.9
3-4	11	6	3		2	5	4	10	1				5	4	2
	3.7	3.8	4.7		2.0	4.2	8.7	7.2	1.0				4.2	4.3	2.6
5-9	13	8	3	2	6	6	1	10	3				4	6	3
	4.4	5.0	4.7	3.9	6.0	5.0	2.2	7.2	3.1				3.3	6.5	3.9
10-24	44	34	1	4	14	15	7	32	11	1			16	10	17
	14.9	21.3	1.6	7.8	14.0	12.6	15.2	23.0	11.2	2.3			13.3	10.8	22.1
25-49	38	27	5	4	15	13	5	21	12	2		2	16	9	11
	12.9	16.9	7.8	7.8	15.0	10.9	10.9	15.1	12.2	4.7		33.3	13.3	9.7	14.3
50 OR MORE	130	48	44	32	45	52	19	33	57	32	5	3	57	42	30
	44.1	30.0	68.8	62.7	45.0	43.7	41.3	23.7	58.2	74.4	62.5	50.0	47.5	45.2	39.0
NOT REPORTED	21	13	6		7	9	4	8	7	5	1		7	7	6
	7.1	8.1	9.4		7.0	7.6	8.7	5.8	7.1	11.6	12.5		5.8	7.5	7.8
AVERAGE NUMBER (INCLUDING NONE)	116	50	178	217	86	128	101	40	111	312	279	459	132	111	102
STANDARD DEVIATION	200	90	211	276	146	217	148	72	133	307	333	452	219	200	171
STANDARD ERROR	12.1	7.4	27.7	38.7	15.1	20.7	22.8	6.3	13.9	49.8	125.9	184.6	20.6	21.5	20.3
AVERAGE NUMBER (EXCLUDING NONE)	132	57	184	257	96	151	112	47	117	339	390	551	152	129	109
STANDARD DEVIATION	208	94	212	284	150	229	151	76	134	305	335	441	228	210	175
STANDARD ERROR	13.3	8.3	28.4	43.3	16.4	23.8	24.6	7.3	14.5	51.5	149.9	197.3	23.1	24.4	21.6

Chart 9

1988 AMA REPORT ON END-USER COMPUTING

SECTION 2: DEPARTMENTAL COMPUTING

PROJECTED EXPENDITURES IN 1989 FOR DEPARTMENTAL/END-USER COMPUTING
* MAINFRAME EXPENDITURES *
* NEW MAINFRAME/MINICOMPUTERS *

		ANNUAL SALES			BUSINESS CATEGORY			WORKSITE POPULATION					WORKSITE DESCRIPTION		
	TOTAL	LESS THAN $100 MIL-LION	$100 TO $500 MIL-LION	MORE THAN $500 MIL-LION	MANU-FACT-URER	SER-VICE PRO-VIDER	OTHER	FEWER THAN 250	250 TO 999	1000 TO 2499	2500 TO 5000	OVER 5000	CORP-ORATE HEAD QUARTERS MULTI-UNIT ORGANI-ZATION	DIVISION SUB-SIDIARY BRANCH LARGER ORGANI-ZATION	ORGANI-ZATION WITH ALL MAJOR UNITS IN ONE LOCATION
BASE- TOTAL RESPONDENTS	295 100.0	160 100.0	64 100.0	51 100.0	100 100.0	119 100.0	46 100.0	139 100.0	98 100.0	43 100.0	8 100.0	6 100.0	120 100.0	93 100.0	77 100.0
$0	132 44.7	79 49.4	27 42.2	17 33.3	50 50.0	52 43.7	19 41.3	72 51.8	37 37.8	16 37.2	3 37.5	3 50.0	51 42.5	37 39.8	42 54.5
$1,000- $4,999															
$5,000- $9,999	1 .3	1 .6						1 .7					1 .8		
$10,000- $24,999	2 .7	2 1.3				2 1.7		2 1.4					1 .8		1 1.3
$25,000- $49,999	1 .3	1 .6			1 1.0				1 1.0						1 1.3
$50,000- $99,999	9 3.1	3 1.9	4 6.3	2 3.9	4 4.0	2 1.7	3 6.5	4 2.9	4 4.1	1 2.3			4 3.3	3 3.2	2 2.6
$100,000- $249,000	20 6.8	12 7.5	4 6.3	1 2.0	4 4.0	5 4.2	6 13.0	9 6.5	8 8.2	3 7.0			6 5.0	5 5.4	9 11.7
OVER $250,000	26 8.8	12 7.5	4 6.3	9 17.6	8 8.0	11 9.2	4 8.7	7 5.0	11 11.2	8 18.6			13 10.8	9 9.7	3 3.9
NOT REPORTED	104 35.3	50 31.3	25 39.1	22 43.1	33 33.0	47 39.5	14 30.4	44 31.7	37 37.8	15 34.9	5 62.5	3 50.0	44 36.7	39 41.9	19 24.7
AVERAGE (IN THOUSANDS OF DOLLARS) (INCLUDING NONE)	162	79	92	191	75	116	107	49	132	239			106	141	60
STANDARD DEVIATION	234	202	233	302	192	270	221	163	256	357			233	296	151
STANDARD ERROR	16.9	19.2	37.3	56.1	23.5	31.8	39.2	14.7	32.8	67.6			26.7	40.3	19.8
AVERAGE (IN THOUSANDS OF DOLLARS) (EXCLUDING)	329	280	300	463	296	419	263	303	336	558			321	447	216
STANDARD DEVIATION	321	298	337	308	284	369	283	232	314	347			310	378	221
STANDARD ERROR	41.8	53.5	97.5	88.9	68.9	82.6	78.5	48.5	64.2	100.2			62.1	91.7	55.4

Chart 10

1988 AMA REPORT ON END-USER COMPUTING

SECTION 2: DEPARTMENTAL COMPUTING

PROJECTED EXPENDITURES IN 1989 FOR DEPARTMENTAL/END-USER COMPUTING
* MAINFRAME EXPENDITURES *
* UPGRADED CAPABILITY FOR EXISTING MAINFRAMES/MINIS *

		ANNUAL SALES			BUSINESS CATEGORY			WORKSITE POPULATION					WORKSITE DESCRIPTION		
	TOTAL	LESS THAN $100 MIL-LION	$100 TO $500 MIL-LION	MORE THAN $500 MIL-LION	MANU-FACT-URER	SER-VICE PRO-VIDER	OTHER	FEWER THAN 250	250 TO 999	1000 TO 2499	2500 TO 5000	OVER 5000	CORP-ORATE HEAD QUARTERS MULTI-UNIT ORGANI-ZATION	DIVISION SUB-SIDIARY BRANCH LARGER ORGANI-ZATION	ORGANI-ZATION WITH ALL MAJOR UNITS IN ONE LOCATION
BASE- TOTAL RESPONDENTS	295 100.0	160 100.0	64 100.0	51 100.0	100 100.0	119 100.0	46 100.0	139 100.0	98 100.0	43 100.0	8 100.0	6 100.0	120 100.0	93 100.0	77 100.0
$0	100 33.9	60 37.5	15 23.4	18 35.3	36 36.0	40 33.6	14 30.4	59 42.4	25 25.5	13 30.2		3 50.0	37 30.8	31 33.3	31 40.3
$1,000- $4,999	2 .7	2 1.3				2 1.7		1 .7	1 1.0					2 2.2	
$5,000- $9,999	5 1.7	4 2.5		1 2.0	2 2.0	2 1.7		5 3.6					3 2.5	1 1.1	1 1.3
$10,000- $24,999	20 6.8	13 8.1	4 6.3	1 2.0	6 6.0	7 5.9	3 6.5	10 7.2	5 5.1	3 7.0	1 12.5		7 5.8	2 2.2	10 13.0
$25,000- $49,999	10 3.4	8 5.0	2 3.1		3 3.0	2 1.7	4 8.7	4 2.9	4 4.1	2 4.7			6 5.0	2 2.2	2 2.6
$50,000- $99,999	19 6.4	12 7.5	6 9.4		9 9.0	7 5.9	2 4.3	9 6.5	9 9.2	1 2.3			6 5.0	7 7.5	6 7.8
$100,000- $249,000	21 7.1	9 5.6	6 9.4	4 7.8	7 7.0	6 5.0	7 15.2	5 3.6	11 11.2	4 9.3	1 12.5		8 6.7	6 6.5	6 7.8
OVER $250,000	13 4.4	1 .6	6 9.4	5 9.8	4 4.0	5 4.2	2 4.3	1 .7	6 6.1	5 11.6	1 12.5		8 6.7	3 3.2	2 2.6
NOT REPORTED	105 35.6	51 31.9	25 39.1	22 43.1	33 33.0	48 40.3	14 30.4	45 32.4	37 37.8	15 34.9	5 62.5	3 50.0	45 37.5	39 41.9	19 24.7
AVERAGE (IN THOUSANDS OF DOLLARS) (INCLUDING NONE)	62	22	124	127	46	76	68	18	80	145	388		82	52	47
STANDARD DEVIATION	160	43	221	268	98	220	112	41	148	273	436		191	146	127
STANDARD ERROR	11.6	4.2	35.4	49.7	12.0	26.1	19.7	4.3	18.9	51.7	251.9		22.0	19.9	16.6
AVERAGE (IN THOUSANDS OF DOLLARS) (EXCLUDING)	131	49	201	334	99	174	121	48	135	270	388		161	122	101
STANDARD DEVIATION	213	54	253	347	126	307	126	57	172	325	436		244	205	170
STANDARD ERROR	22.4	7.7	51.8	104.6	22.6	35.1	29.7	9.6	28.7	84.1	251.9		39.5	42.8	32.8

Chart 11

1988 AMA REPORT ON END-USER COMPUTING

SECTION 3: DEPARTMENTAL COMPUTING

PROJECTED EXPENDITURES IN 1989 FOR DEPARTMENTAL/END-USER COMPUTING
* MAINFRAME EXPENDITURES *
* ADDITIONAL TERMINALS/WORKSTATIONS *

		ANNUAL SALES			BUSINESS CATEGORY			WORKSITE POPULATION					WORKSITE DESCRIPTION		
	TOTAL	LESS THAN $100 MIL-LION	$100 TO $500 MIL-LION	MORE THAN $500 MIL-LION	MANU-FACT-URER	SER-VICE PRO-VIDER	OTHER	FEWER THAN 250	250 TO 999	1000 TO 2499	2500 TO 5000	OVER 5000	CORP-ORATE HEAD QUARTERS MULTI-UNIT ORGANI-ZATION	DIVISION SUB-SIDIARY BRANCH LARGER ORGANI-ZATION	ORGANI-ZATION WITH ALL MAJOR UNITS IN ONE LOCATION
BASE- TOTAL RESPONDENTS	295	160	64	51	100	119	46	139	98	43	8	6	120	93	77
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
$0	94	54	20	14	33	39	14	51	27	11	1	3	42	27	24
	31.9	33.8	31.3	27.5	33.0	32.8	30.4	36.7	27.6	25.6	12.5	50.0	35.0	29.0	31.2
$1,000- $4,999	14	13		1	4	4	5	10	3	1			2	4	8
	4.7	8.1		2.0	4.0	3.4	10.9	7.2	3.1	2.3			1.7	4.3	10.4
$5,000- $9,999	22	14	4	2	9	8	3	9	10	3			10	4	8
	7.5	8.8	6.3	3.9	9.0	6.7	6.5	6.5	10.2	7.0			8.3	4.3	10.4
$10,000- $24,999	28	17	6	2	12	6	5	15	10	3			10	7	9
	9.5	10.6	9.4	3.9	12.0	5.0	10.9	10.8	10.2	7.0			8.3	7.5	11.7
$25,000- $49,999	9	4	3	2	5	4		5	2	2			2	4	3
	3.1	2.5	4.7	3.9	5.0	3.4		3.6	2.0	4.7			1.7	4.3	3.9
$50,000- $99,999	7	3	3	1	2	3	2	3	3		1		1	3	3
	2.4	1.9	4.7	2.0	2.0	2.5	4.3	2.2	3.1		12.5		.8	3.2	3.9
$100,000- $249,000	12	3	3	4	1	5	2	1	4	7			5	4	3
	4.1	1.9	4.7	7.8	1.0	4.2	4.3	.7	4.1	16.3			4.2	4.3	3.9
OVER $250,000	4	1		3	1	2	1		2	1	1		3	1	
	1.4	.6		5.9	1.0	1.7	2.2		2.0	2.3	12.5		2.5	1.1	
NOT REPORTED	105	51	25	22	33	48	14	45	37	15	5	3	45	39	19
	35.6	31.9	39.1	43.1	33.0	40.3	30.4	32.4	37.8	34.9	62.5	50.0	37.5	41.9	24.7
AVERAGE (IN THOUSANDS OF DOLLARS) (INCLUDING NONE)	28	19	22	73	21	25	46	8	46	52	150		33	38	15
STANDARD DEVIATION	101	97	43	159	91	66	174	15	158	78	177		105	137	34
STANDARD ERROR	7.3	9.3	7.0	29.6	11.1	7.9	30.8	1.6	20.3	14.9	102.7		12.1	18.7	4.4
AVERAGE (IN THOUSANDS OF DOLLARS) (EXCLUDING)	56	38	45	142	41	56	82	17	82	85	225		75	75	26
STANDARD DEVIATION	137	135	53	198	125	90	226	20	205	86	175		148	188	41
STANDARD ERROR	13.9	18.2	12.3	51.2	21.4	15.9	53.3	3.0	35.2	21.0	123.7		25.9	36.1	7.0

Chart 12

PROJECTED EXPENDITURES IN 1989 FOR DEPARTMENTAL/END-USER COMPUTING
* MAINFRAME EXPENDITURES *
* OPERATIONAL SOFTWARE *

		ANNUAL SALES			BUSINESS CATEGORY			WORKSITE POPULATION					WORKSITE DESCRIPTION		
	TOTAL	LESS THAN $100 MIL-LION	$100 TO $500 MIL-LION	MORE THAN $500 MIL-LION	MANU-FACT-URER	SER-VICE PRO-VIDER	OTHER	FEWER THAN 250	250 TO 999	1000 TO 2499	2500 TO 5000	OVER 5000	CORP-ORATE HEAD QUARTERS MULTI-UNIT ORGANI-ZATION	DIVISION SUB-SIDIARY BRANCH LARGER ORGANI-ZATION	ORGANI-ZATION WITH ALL MAJOR UNITS IN ONE LOCATION
BASE- TOTAL RESPONDENTS	295	160	64	51	100	119	46	139	98	43	8	6	120	93	77
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
$0	118	72	23	15	47	45	16	66	37	10	1	3	46	32	37
	40.0	45.0	35.9	29.4	47.0	37.8	34.8	47.5	37.8	23.3	12.5	50.0	38.3	34.4	48.1
$1,000- $4,999	10	7	2		1	4	4	4	3	3			4	3	3
	3.4	4.4	3.1		1.0	3.4	8.7	2.9	3.1	7.0			3.3	3.2	3.9
$5,000- $9,999	9	7		1	2	4	1	7		2			1	3	5
	3.1	4.4		2.0	2.0	3.4	2.2	5.0		4.7			.8	3.2	6.5
$10,000- $24,999	21	14	5	2	6	10	5	10	9	2			8	6	7
	7.1	8.8	7.8	3.9	6.0	8.4	10.9	7.2	9.2	4.7			6.7	6.5	9.1
$25,000- $49,999	6	3	2		3		1	3	3				5		1
	2.0	1.9	3.1		3.0		2.2	2.2	3.1				4.2		1.3
$50,000- $99,999	5	1	1	2	2	1	1			4	1		2	2	1
	1.7	.6	1.6	3.9	2.0	.8	2.2			9.3	12.5		1.7	2.2	1.3
$100,000- $249,000	14	3	5	6	5	5	3	3	7	4			6	6	2
	4.7	1.9	7.8	11.8	5.0	4.2	6.5	2.2	7.1	9.3			5.0	6.5	2.6
OVER $250,000	7	2	1	3	1	2	1	1	2	3	1		3	2	2
	2.4	1.3	1.6	5.9	1.0	1.7	2.2	.7	2.0	7.0	12.5		2.5	2.2	2.6
NOT REPORTED	105	51	25	22	33	48	14	45	37	15	5	3	45	39	19
	35.6	31.9	39.1	43.1	33.0	40.3	30.4	32.4	37.8	34.9	62.5	50.0	37.5	41.9	24.7
AVERAGE (IN THOUSANDS OF DOLLARS) (INCLUDING NONE)	34	14	37	93	21	32	34	10	32	109	183		41	37	26
STANDARD DEVIATION	114	50	91	196	67	128	73	37	83	230	225		129	117	87
STANDARD ERROR	8.2	4.8	14.6	36.4	8.2	15.2	13.0	3.8	10.6	43.5	129.9		15.0	15.9	11.5
AVERAGE (IN THOUSANDS OF DOLLARS) (EXCLUDING)	91	40	91	192	71	88	68	34	82	170	275		105	91	71
STANDARD DEVIATION	170	81	123	246	108	200	92	61	116	268	225		192	169	134
STANDARD ERROR	20.1	13.3	30.9	63.9	24.2	39.2	23.0	11.6	23.6	63.2	159.0		35.7	36.1	29.3

Chart 13

1988 AMA REPORT ON END-USER COMPUTING

SECTION 2: DEPARTMENTAL COMPUTING

PROJECTED EXPENDITURES IN 1989 FOR DEPARTMENTAL/END-USER COMPUTING
* MAINFRAME EXPENDITURES *
* APPLICATIONS SOFTWARE *

		ANNUAL SALES			BUSINESS CATEGORY			WORKSITE POPULATION					WORKSITE DESCRIPTION		
	TOTAL	LESS THAN $100 MIL-LION	$100 TO $500 MIL-LION	MORE THAN $500 MIL-LION	MANU-FACT-URER	SER-VICE PRO-VIDER	OTHER	FEWER THAN 250	250 TO 999	1000 TO 2499	2500 TO 5000	OVER 5000	CORP-ORATE HEAD QUARTERS MULTI-UNIT ORGANI-ZATION	DIVISION SUB-SIDIARY BRANCH LARGER ORGANI-ZATION	ORGANI-ZATION WITH ALL MAJOR UNITS IN ONE LOCATION
BASE- TOTAL RESPONDENTS	295	160	64	51	100	119	46	139	98	43	8	6	120	93	77
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
$0	110	65	18	17	37	43	19	63	32	10	1	3	45	29	33
	37.3	40.6	28.1	33.3	37.0	36.1	41.3	45.3	32.7	23.3	12.5	50.0	37.5	31.2	42.9
$1,000- $4,999	12	7	2	2	2	4	5	8	2	2			2	5	5
	4.1	4.4	3.1	3.9	2.0	3.4	10.9	5.8	2.0	4.7			1.7	5.4	6.5
$5,000- $9,999	3	3			1	2		2	1				1	2	
	1.0	1.9			1.0	1.7		1.4	1.0				.8	2.2	
$10,000- $24,999	14	10	3	1	8	3	2	6	7	1			7	1	6
	4.7	6.3	4.7	2.0	8.0	2.5	4.3	4.3	7.1	2.3			5.8	1.1	7.8
$25,000- $49,999	14	11	2	1	7	3	3	4	9	1			5	5	4
	4.7	6.9	3.1	2.0	7.0	2.5	6.5	2.9	9.2	2.3			4.2	5.4	5.2
$50,000- $99,999	9	4	3	1	1	4	2	3	1	5			2	4	3
	3.1	2.5	4.7	2.0	1.0	3.4	4.3	2.2	1.0	11.6			1.7	4.3	3.9
$100,000- $249,000	14	8	4	1	3	9		7	4	3			6	4	4
	4.7	5.0	6.3	2.0	3.0	7.6		5.0	4.1	7.0			5.0	4.3	5.2
OVER $250,000	13		7	6	7	3	1		5	6	2		6	4	3
	4.4		10.9	11.8	7.0	2.5	2.2		5.1	14.0	25.0		5.0	4.3	3.9
NOT REPORTED	106	52	25	22	34	48	14	46	37	15	5	3	46	39	19
	35.9	32.5	39.1	43.1	34.0	40.3	30.4	33.1	37.8	34.9	62.5	50.0	38.3	41.9	24.7
AVERAGE (IN THOUSANDS OF DOLLARS) (INCLUDING NONE)	46	17	88	110	46	51	17	16	46	126	283		53	44	40
STANDARD DEVIATION	120	36	150	221	99	142	46	41	111	212	209		143	99	109
STANDARD ERROR	8.7	3.4	24.0	41.1	12.2	16.8	8.2	4.2	14.2	40.2	121.2		16.6	13.5	14.3
AVERAGE (IN THOUSANDS OF DOLLARS) (EXCLUDING)	109	42	164	266	104	128	42	49	96	197	425		136	95	92
STANDARD DEVIATION	167	47	171	277	129	204	65	60	145	237	75		202	128	152
STANDARD ERROR	18.8	7.2	37.3	80.1	23.9	38.5	18.2	11.0	27.0	55.9	53.0		37.5	25.6	30.4

Chart 14

1988 AMA REPORT ON END-USER COMPUTING

SECTION 2: DEPARTMENTAL COMPUTING

PROJECTED EXPENDITURES IN 1989 FOR DEPARTMENTAL/END-USER COMPUTING

* MAINFRAME EXPENDITURES *

* TELECOMMUNICATIONS *

		ANNUAL SALES			BUSINESS CATEGORY			WORKSITE POPULATION					WORKSITE DESCRIPTION		
	TOTAL	LESS THAN $100 MILLION	$100 TO $500 MILLION	MORE THAN $500 MILLION	MANUFACTURER	SERVICE PROVIDER	OTHER	FEWER THAN 250	250 TO 999	1000 TO 2499	2500 TO 5000	OVER 5000	CORPORATE HEAD QUARTERS MULTI-UNIT ORGANIZATION	DIVISION SUBSIDIARY BRANCH LARGER ORGANIZATION	ORGANIZATION WITH ALL MAJOR UNITS IN ONE LOCATION
BASE- TOTAL RESPONDENTS	295	160	64	51	100	119	46	139	98	43	8	6	120	93	77
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
$0	113	67	20	16	42	39	20	63	33	11	2	3	44	28	38
	38.3	41.9	31.3	31.4	42.0	32.8	43.5	45.3	33.7	25.6	25.0	50.0	36.7	30.1	49.4
$1,000- $4,999	9	7	2		1	3	4	4	2	3			5	2	2
	3.1	4.4	3.1		1.0	2.5	8.7	2.9	2.0	7.0			4.2	2.2	2.6
$5,000- $9,999	11	8	1	2	4	7		8	3				4	3	4
	3.7	5.0	1.6	3.9	4.0	5.9		5.8	3.1				3.3	3.2	5.2
$10,000- $24,999	15	12	5	1	10	5	3	10	7	2			6	10	3
	6.4	7.5	7.8	2.0	10.0	4.2	6.5	7.2	7.1	4.7			5.0	10.8	3.9
$25,000- $49,999	9	7	2		3	5		3	3	3			4		5
	3.1	4.4	3.1		3.0	4.2		2.2	3.1	7.0			3.3		6.5
$50,000- $99,999	11	3	5	2	3	4	3	3	3	5			3	6	2
	3.7	1.9	7.8	3.9	3.0	3.4	6.5	2.2	3.1	11.6			2.5	6.5	2.6
$100,000- $249,000	9	2	4	3	3	4	1	2	5	1	1		4	2	3
	3.1	1.3	6.3	5.9	3.0	3.4	2.2	1.4	5.1	2.3	12.5		3.3	2.2	3.9
OVER $250,000	9	3		5	1	4	1	1	5	3			5	3	1
	3.1	1.9		9.8	1.0	3.4	2.2	.7	5.1	7.0			4.2	3.2	1.3
NOT REPORTED	105	51	25	22	33	48	14	45	37	15	5	3	45	39	19
	35.6	31.9	39.1	43.1	33.0	40.3	30.4	32.4	37.8	34.9	62.5	50.0	37.5	41.9	24.7
AVERAGE (IN THOUSANDS OF DOLLARS) (INCLUDING NONE)	50	30	23	148	28	60	41	12	80	116	67		61	60	28
STANDARD DEVIATION	173	139	40	289	123	192	173	46	223	274	94		192	196	119
STANDARD ERROR	12.5	13.3	6.5	53.7	15.1	22.8	30.7	4.7	28.6	51.9	34.2		22.2	26.4	15.6
AVERAGE (IN THOUSANDS OF DOLLARS) (EXCLUDING)	123	78	48	330	75	133	110	37	175	187	200		149	126	80
STANDARD DEVIATION	254	215	46	356	193	269	269	74	303	332			276	265	192
STANDARD ERROR	29.0	33.2	10.7	98.7	38.7	47.6	77.9	13.3	57.3	80.6			49.7	52.1	43.0

Chart 15

1988 AMA REPORT ON END-USER COMPUTING

SECTION 2: DEPARTMENTAL COMPUTING

PROJECTED EXPENDITURES IN 1989 FOR DEPARTMENTAL/END-USER COMPUTING
* MICROCOMPUTER EXPENDITURES *
* NEW MICROCOMPUTERS *

		ANNUAL SALES			BUSINESS CATEGORY			WORKSITE POPULATION					WORKSITE DESCRIPTION		
	TOTAL	LESS THAN $100 MIL-LION	$100 TO $500 MIL-LION	MORE THAN $500 MIL-LION	MANU-FACT-URER	SER-VICE PRO-VIDER	OTHER	FEWER THAN 250	250 TO 999	1000 TO 2499	2500 TO 5000	OVER 5000	CORP-ORATE HEAD QUARTERS MULTI-UNIT ORGANI-ZATION	DIVISION SUB-SIDIARY BRANCH LARGER ORGANI-ZATION	ORGANI-ZATION WITH ALL MAJOR UNITS IN ONE LOCATION
BASE- TOTAL RESPONDENTS	295	160	64	51	100	119	46	139	98	43	8	6	120	93	77
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
$0	71	46	7	11	25	25	11	46	17	6		1	25	21	23
	24.1	28.8	10.9	21.6	25.0	21.0	23.9	33.1	17.3	14.0		16.7	20.8	22.6	29.9
$1,000- $4,999	3	3			1		1	3					2	1	
	1.0	1.9			1.0		2.2	2.2					1.7	1.1	
$5,000- $9,999	10	8	1	1	6	3	1	6	4				4	3	3
	3.4	5.0	1.6	2.0	6.0	2.5	2.2	4.3	4.1				3.3	3.2	3.9
$10,000- $24,999	33	26	5	1	16	11	5	18	11	4			10	12	11
	11.2	16.3	7.8	2.0	16.0	9.2	10.9	12.9	11.2	9.3			8.3	12.9	14.3
$25,000- $49,999	23	12	7	1	8	7	5	12	7	4			7	7	8
	7.8	7.5	10.9	2.0	8.0	5.9	10.9	8.6	7.1	9.3			5.8	7.5	10.4
$50,000- $99,999	16	8	4	3	7	7		4	7	3	1	1	6	2	8
	5.4	5.0	6.3	5.9	7.0	5.9		2.9	7.1	7.0	12.5	16.7	5.0	2.2	10.4
$100,000- $249,000	20	5	11	3	3	9	7	5	9	6			12	3	5
	6.8	3.1	17.2	5.9	3.0	7.6	15.2	3.6	9.2	14.0			10.0	3.2	6.5
OVER $250,000	14	1	4	9	1	9	2		6	5	2	1	9	5	
	4.7	.6	6.3	17.6	1.0	7.6	4.3		6.1	11.6	25.0	16.7	7.5	5.4	
NOT REPORTED	105	51	25	22	33	48	14	45	37	15	5	3	45	39	19
	35.6	31.9	39.1	43.1	33.0	40.3	30.4	32.4	37.8	34.9	62.5	50.0	37.5	41.9	24.7
AVERAGE (IN THOUSANDS OF DOLLARS) (INCLUDING NONE)	55	20	106	136	25	87	57	17	67	135	250	117	78	58	26
STANDARD DEVIATION	115	39	156	179	46	160	85	34	98	211	147	130	134	135	36
STANDARD ERROR	8.3	3.7	25.1	33.3	5.6	19.0	15.1	3.5	12.5	39.8	84.9	75.5	15.4	18.4	4.8
AVERAGE (IN THOUSANDS OF DOLLARS) (EXCLUDING)	89	35	129	218	39	134	86	33	92	172	250	175	117	95	43
STANDARD DEVIATION	134	46	164	184	53	183	93	42	105	224	147	125	149	163	38
STANDARD ERROR	12.3	5.8	29.0	43.5	8.3	27.0	20.4	6.0	15.8	47.8	84.9	88.3	21.1	28.3	6.5

Chart 16

1988 AMA REPORT ON END-USER
COMPUTING

SECTION 2: DEPARTMENTAL COMPUTING

PROJECTED EXPENDITURES IN 1989 FOR DEPARTMENTAL/END-USER COMPUTING
* MICROCOMPUTER EXPENDITURES *
* MICRO SOFTWARE *

		ANNUAL SALES			BUSINESS CATEGORY			WORKSITE POPULATION					WORKSITE DESCRIPTION		
	TOTAL	LESS THAN $100 MIL-LION	$100 TO $500 MIL-LION	MORE THAN $500 MIL-LION	MANU-FACT-URER	SER-VICE PRO-VIDER	OTHER	FEWER THAN 250	250 TO 999	1000 TO 2499	2500 TO 5000	OVER 5000	CORP-ORATE HEAD QUARTERS MULTI-UNIT ORGANI-ZATION	DIVISION SUB-SIDIARY BRANCH LARGER ORGANI-ZATION	ORGANI-ZATION WITH ALL MAJOR UNITS IN ONE LOCATION
BASE- TOTAL RESPONDENTS	295	160	64	51	100	119	46	139	98	43	8	6	120	93	77
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
$0	160	93	32	25	61	58	23	83	49	22	3	2	62	44	51
	54.2	58.1	50.0	49.0	61.0	48.7	50.0	59.7	50.0	51.2	37.5	33.3	51.7	47.3	66.2
$1,000- $4,999	4	3					3	2		2			2	1	1
	1.4	1.9					6.5	1.4		4.7			1.7	1.1	1.3
$5,000- $9,999	7	5	1		1	3	3	5	1	1			2	4	1
	2.4	3.1	1.6		1.0	2.5	6.5	3.6	1.0	2.3			1.7	4.3	1.3
$10,000- $24,999	8	5	1	1	3	4		4	2	2			4	2	2
	2.7	3.1	1.6	2.0	3.0	3.4		2.9	2.0	4.7			3.3	2.2	2.6
$25,000- $49,999	2	1	1			2			2				1	1	
	.7	.6	1.6			1.7			2.0				.8	1.1	
$50,000- $99,999	5	2	1	2	2	1	2		4			1	3	1	1
	1.7	1.3	1.6	3.9	2.0	.8	4.3		4.1			16.7	2.5	1.1	1.3
$100,000- $249,000	4		3	1		3	1		3	1			1	1	2
	1.4		4.7	2.0		2.5	2.2		3.1	2.3			.8	1.1	2.6
OVER $250,000															
NOT REPORTED	105	51	25	22	33	48	14	45	37	15	5	3	45	39	19
	35.6	31.9	39.1	43.1	33.0	40.3	30.4	32.4	37.8	34.9	62.5	50.0	37.5	41.9	24.7
AVERAGE (IN THOUSANDS OF DOLLARS) (INCLUDING NONE)	5	2	13	9	2	8	8	1	10	8		23	5	4	6
STANDARD DEVIATION	20	7	36	24	10	28	21	3	25	33		33	17	15	27
STANDARD ERROR	1.4	.7	5.7	4.5	1.2	3.3	3.0	.3	3.2	6.3		19.1	1.9	2.1	3.6
AVERAGE (IN THOUSANDS OF DOLLARS) (EXCLUDING)	34	15	71	64	28	45	27	8	52	38		70	31	24	53
STANDARD DEVIATION	40	14	56	28	19	51	33	5	33	63			30	28	61
STANDARD ERROR	7.6	3.6	21.3	14.0	8.0	14.2	11.2	1.6	9.5	26.0			8.3	9.0	23.3

Chart 17

1988 AMA REPORT ON END-USER
COMPUTING

SECTION 2: DEPARTMENTAL COMPUTING

PROJECTED EXPENDITURES IN 1989 FOR DEPARTMENTAL/END-USER COMPUTING
* MICROCOMPUTER EXPENDITURES *
* PERIPHERALS *

		ANNUAL SALES			BUSINESS CATEGORY			WORKSITE POPULATION					WORKSITE DESCRIPTION		
	TOTAL	LESS THAN $100 MILLION	$100 TO $500 MILLION	MORE THAN $500 MILLION	MANUFACTURER	SERVICE PROVIDER	OTHER	FEWER THAN 250	250 TO 999	1000 TO 2499	2500 TO 5000	OVER 5000	CORPORATE HEAD QUARTERS MULTI-UNIT ORGANIZATION	DIVISION SUBSIDIARY BRANCH LARGER ORGANIZATION	ORGANIZATION WITH ALL MAJOR UNITS IN ONE LOCATION
BASE- TOTAL RESPONDENTS	295	160	64	51	100	119	46	139	98	43	8	6	120	93	77
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
$0	105	65	19	12	39	39	15	61	33	9	1		41	28	34
	35.6	40.6	29.7	23.5	39.0	32.8	32.6	43.9	33.7	20.9	12.5		34.2	30.1	44.2
$1,000- $4,999	9	7	1	1	4	2	2	5	2	2			3	3	3
	3.1	4.4	1.6	2.0	4.0	1.7	4.3	3.6	2.0	4.7			2.5	3.2	3.9
$5,000- $9,999	20	13	4	2	8	6	4	6	11	2		1	8	6	6
	6.8	8.1	6.3	3.9	8.0	5.0	8.7	4.3	11.2	4.7		16.7	6.7	6.5	7.8
$10,000- $24,999	23	16	2	3	8	9	5	13	5	5			5	8	9
	7.8	10.0	3.1	5.9	8.0	7.6	10.9	9.4	5.1	11.6			4.2	8.6	11.7
$25,000- $49,999	10	4	6		3	4	2	6	3	1			6	1	3
	3.4	2.5	9.4		3.0	3.4	4.3	4.3	3.1	2.3			5.0	1.1	3.9
$50,000- $99.999	11	3	4	4	4	5	2	2	3	4		2	5	4	2
	3.7	1.9	6.3	7.8	4.0	4.2	4.3	1.4	3.1	9.3		33.3	4.2	4.3	2.6
$100,000- $249,000	11	1	2	7	1	5	2	1	4	4	2		7	3	1
	3.7	.6	3.1	13.7	1.0	4.2	4.3	.7	4.1	9.3	25.0		5.8	3.2	1.3
OVER $250,000	1		1			1				1				1	
	.3		1.6			.8				2.3				1.1	
NOT REPORTED	105	51	25	22	33	48	14	45	37	15	5	3	45	39	19
	35.6	31.9	39.1	43.1	33.0	40.3	30.4	32.4	37.8	34.9	62.5	50.0	37.5	41.9	24.7
AVERAGE (IN THOUSANDS OF DOLLARS) (INCLUDING NONE)	17	6	27	43	9	22	16	6	15	50	67	35	20	23	9
STANDARD DEVIATION	40	14	55	58	20	51	31	14	33	76	46	21	39	54	22
STANDARD ERROR	2.9	1.3	8.8	10.8	2.4	6.0	5.5	1.5	4.2	14.5	26.9	12.2	4.5	7.3	2.9
AVERAGE (IN THOUSANDS OF DOLLARS) (EXCLUDING)	38	16	53	73	24	50	30	18	33	74	100	35	63	47	22
STANDARD DEVIATION	53	18	67	60	26	65	38	20	42	83		21	49	70	30
STANDARD ERROR	5.8	2.7	15.0	14.6	5.0	11.6	9.2	3.4	8.0	19.0		12.2	8.4	13.8	6.2

Chart 18

1988 AMA REPORT ON END-USER COMPUTING

SECTION 2: DEPARTMENTAL COMPUTING

NECESSARY AUTHORIZATION FOR...
PURCHASE OF MAINFRAME/MINI HARDWARE

		ANNUAL SALES			BUSINESS CATEGORY			WORKSITE POPULATION					WORKSITE DESCRIPTION		
	TOTAL	LESS THAN $100 MIL-LION	$100 TO $500 MIL-LION	MORE THAN $500 MIL-LION	MANU-FACT-URER	SER-VICE PRO-VIDER	OTHER	FEWER THAN 250	250 TO 999	1000 TO 2499	2500 TO 5000	OVER 5000	CORP-ORATE HEAD QUARTERS MULTI-UNIT ORGANI-ZATION	DIVISION SUB-SIDIARY BRANCH LARGER ORGANI-ZATION	ORGANI-ZATION WITH ALL MAJOR UNITS IN ONE LOCATION
BASE- TOTAL RESPONDENTS	295	160	64	51	100	119	46	139	98	43	8	6	120	93	77
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MIS/DP	249	130	59	45	85	101	36	107	89	40	7	5	110	72	62
	84.4	81.3	92.2	88.2	85.0	84.9	78.3	77.0	90.8	93.0	87.5	83.3	91.7	77.4	80.5
END-USER DEPARTMENT	36	18	8	8	9	17	8	18	11	5	2		15	14	6
	12.2	11.3	12.5	15.7	9.0	14.3	17.4	12.9	11.2	11.6	25.0		12.5	15.1	7.8
INFORMATION CENTER	14	6	5	2	2	9	3	7	2	4	1		5	6	2
	4.7	3.8	7.8	3.9	2.0	7.6	6.5	5.0	2.0	9.3	12.5		4.2	6.5	2.6
OTHER	29	16	5	4	10	11	6	17	5	3	3	1	7	13	9
	9.8	10.0	7.8	7.8	10.0	9.2	13.0	12.2	5.1	7.0	37.5	16.7	5.8	14.0	11.7
NOT REPORTED	20	12	3	3	9	5	3	12	5	2		1	5	10	5
	6.8	7.5	4.7	5.9	9.0	4.2	6.5	8.6	5.1	4.7		16.7	4.2	10.8	6.5
KEY PLAYER															
MIS/DP	146	85	35	23	49	60	27	65	56	20	2	2	67	42	35
	49.5	53.1	54.7	45.1	49.0	50.4	58.7	46.8	57.1	46.5	25.0	33.3	55.8	45.2	45.5
END-USER DEPARTMENT	10	3	2	4	4	5	1	5	2	1	2		3	6	1
	3.4	1.9	3.1	7.8	4.0	4.2	2.2	3.6	2.0	2.3	25.0		2.5	6.5	1.3
INFORMATION CENTER	2	1				1	1	2					1	1	
	.7	.6				.8	2.2	1.4					.8	1.1	
OTHER	32	21	3	4	10	12	5	16	5	7	3	1	9	10	12
	10.8	13.1	4.7	7.8	10.0	10.1	10.9	11.5	5.1	16.3	37.5	16.7	7.5	10.8	15.6
NONE REPORTED	105	50	24	20	37	41	12	51	35	15	1	3	40	34	29
	35.6	31.3	37.5	39.2	37.0	34.5	26.1	36.7	35.7	34.9	12.5	50.0	33.3	36.6	37.7

Chart 19

1988 AMA REPORT ON END-USER COMPUTING

SECTION 2: DEPARTMENTAL COMPUTING

NECESSARY AUTHORIZATION FOR...
PURCHASE OF MAINFRAME/MINI SOFTWARE

		ANNUAL SALES			BUSINESS CATEGORY			WORKSITE POPULATION					WORKSITE DESCRIPTION		
	TOTAL	LESS THAN $100 MILLION	$100 TO $500 MILLION	MORE THAN $500 MILLION	MANUFACTURER	SERVICE PROVIDER	OTHER	FEWER THAN 250	250 TO 999	1000 TO 2499	2500 TO 5000	OVER 5000	CORPORATE HEAD QUARTERS MULTI-UNIT ORGANIZATION	DIVISION SUBSIDIARY BRANCH LARGER ORGANIZATION	ORGANIZATION WITH ALL MAJOR UNITS IN ONE LOCATION
BASE- TOTAL RESPONDENTS	295	160	64	51	100	119	46	139	98	43	8	6	120	93	77
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MIS/DP	245	126	60	44	85	99	35	104	88	40	7	5	107	70	63
	83.1	78.8	93.8	86.3	85.0	83.2	76.1	74.8	89.8	93.0	87.5	83.3	89.2	75.3	81.8
END-USER DEPARTMENT	70	36	15	16	22	31	13	33	20	13	3	1	28	30	11
	23.7	22.5	23.4	31.4	22.0	26.1	28.3	23.7	20.4	30.2	37.5	16.7	23.3	32.3	14.3
INFORMATION CENTER	21	8	6	5	4	11	3	7	4	7	2	1	8	8	4
	7.1	5.0	9.4	9.8	4.0	9.2	6.5	5.0	4.1	16.3	25.0	16.7	6.7	8.6	5.2
OTHER	27	15	4	5	10	10	5	15	5	3	3	1	8	12	7
	9.2	9.4	6.3	9.8	10.0	8.4	10.9	10.8	5.1	7.0	37.5	16.7	6.7	12.9	9.1
NOT REPORTED	22	12	3	4	9	5	4	13	6	2		1	6	10	6
	7.5	7.5	4.7	7.8	9.0	4.2	8.7	9.4	6.1	4.7		16.7	5.0	10.8	7.8
KEY PLAYER															
MIS/DP	144	82	34	24	50	59	25	65	52	22	2	2	66	40	36
	48.8	51.3	53.1	47.1	50.0	49.6	54.3	46.8	53.1	51.2	25.0	33.3	55.0	43.0	46.8
END-USER DEPARTMENT	12	5	2	4	4	7	1	6	2	2	2		3	8	1
	4.1	3.1	3.1	7.8	4.0	5.9	2.2	4.3	2.0	4.7	25.0		2.5	8.6	1.3
INFORMATION CENTER	2	1				1	1	2					1	1	
	.7	.6				.8	2.2	1.4					.8	1.1	
OTHER	30	21	2	4	10	10	6	16	5	5	3	1	9	10	10
	10.2	13.1	3.1	7.8	10.0	8.4	13.0	11.5	5.1	11.6	37.5	16.7	7.5	10.8	13.0
NONE REPORTED	107	51	26	19	36	42	13	50	39	14	1	3	41	34	30
	36.3	31.9	40.6	37.3	36.0	35.3	28.3	36.0	39.8	32.6	12.5	50.0	34.2	36.6	39.0

Chart 20

1988 AMA REPORT ON END-USER
COMPUTING

SECTION 2: DEPARTMENTAL COMPUTING

NECESSARY AUTHORIZATION FOR... --
PURCHASE OF MICRO HARDWARE

		ANNUAL SALES			BUSINESS CATEGORY			WORKSITE POPULATION					WORKSITE DESCRIPTION		
	TOTAL	LESS THAN $100 MILLION	$100 TO $500 MILLION	MORE THAN $500 MILLION	MANUFACTURER	SERVICE PROVIDER	OTHER	FEWER THAN 250	250 TO 999	1000 TO 2499	2500 TO 5000	OVER 5000	CORPORATE HEAD QUARTERS MULTI-UNIT ORGANIZATION	DIVISION SUBSIDIARY BRANCH LARGER ORGANIZATION	ORGANIZATION WITH ALL MAJOR UNITS IN ONE LOCATION
BASE- TOTAL RESPONDENTS	295	160	64	51	100	119	46	139	98	43	8	6	120	93	77
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MIS/DP	183	97	40	31	59	72	32	87	56	28	7	4	81	48	49
	62.0	60.6	62.5	60.8	59.0	60.5	69.6	62.6	57.1	65.1	87.5	66.7	67.5	51.6	63.6
END-USER DEPARTMENT	149	76	33	33	55	63	20	58	56	25	5	5	58	55	34
	50.5	47.5	51.6	64.7	55.0	52.9	43.5	41.7	57.1	58.1	62.5	83.3	48.3	59.1	44.2
INFORMATION CENTER	60	13	23	20	13	23	14	14	21	18	4	3	34	13	12
	20.3	8.1	35.9	39.2	13.0	19.3	30.4	10.1	21.4	41.9	50.0	50.0	28.3	14.0	15.6
OTHER	33	18	7	4	12	13	7	20	7	3	2	1	9	16	7
	11.2	11.3	10.9	7.8	12.0	10.9	15.2	14.4	7.1	7.0	25.0	16.7	7.5	17.2	9.1
NOT REPORTED	17	12	3	1	6	6	1	9	7	1			6	4	7
	5.8	7.5	4.7	2.0	6.0	5.0	2.2	6.5	7.1	2.3			5.0	4.3	9.1
KEY PLAYER															
MIS/DP	104	62	23	14	38	41	16	55	34	12	1	1	47	29	26
	35.3	38.8	35.9	27.5	38.0	34.5	34.8	39.6	34.7	27.9	12.5	16.7	39.2	31.2	33.8
END-USER DEPARTMENT	38	22	7	8	12	20	3	18	12	5	2	1	13	14	11
	12.9	13.8	10.9	15.7	12.0	16.8	6.5	12.9	12.2	11.6	25.0	16.7	10.8	15.1	14.3
INFORMATION CENTER	21	3	10	6	6	3	10	3	11	4	1	2	11	6	4
	7.1	1.9	15.6	11.8	6.0	2.5	21.7	2.2	11.2	9.3	12.5	33.3	9.2	6.5	5.2
OTHER	31	20	3	5	10	10	8	16	6	7	2		9	14	7
	10.5	12.5	4.7	9.8	10.0	8.4	17.4	11.5	6.1	16.3	25.0		7.5	15.1	9.1
NONE REPORTED	101	53	21	18	34	45	9	47	35	15	2	2	40	30	29
	34.2	33.1	32.8	35.3	34.0	37.8	19.6	33.8	35.7	34.9	25.0	33.3	33.3	32.3	37.7

Chart 21

1988 AMA REPORT ON END-USER COMPUTING

SECTION 3: DEPARTMENTAL COMPUTING

NECESSARY AUTHORIZATION FOR...
PURCHASE OF MICRO SOFTWARE

		ANNUAL SALES			BUSINESS CATEGORY			WORKSITE POPULATION					WORKSITE DESCRIPTION		
	TOTAL	LESS THAN $100 MILLION	$100 TO $500 MILLION	MORE THAN $500 MILLION	MANUFACTURER	SERVICE PROVIDER	OTHER	FEWER THAN 250	250 TO 999	1000 TO 2499	2500 TO 5000	OVER 5000	CORPORATE HEAD QUARTERS MULTI-UNIT ORGANIZATION	DIVISION SUBSIDIARY BRANCH LARGER ORGANIZATION	ORGANIZATION WITH ALL MAJOR UNITS IN ONE LOCATION
BASE- TOTAL RESPONDENTS	295	160	64	51	100	119	46	139	98	43	8	6	120	93	77
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MIS/DP	156	83	31	28	55	55	29	72	50	26	6	2	71	39	42
	52.9	51.9	48.4	54.9	55.0	46.2	63.0	51.8	51.0	60.5	75.0	33.3	59.2	41.9	54.5
END-USER DEPARTMENT	169	90	37	35	64	72	20	69	61	27	7	4	65	63	38
	57.3	56.3	57.8	68.6	64.0	60.5	43.5	49.6	62.2	62.8	87.5	66.7	54.2	67.7	49.4
INFORMATION CENTER	60	14	23	19	13	22	15	15	21	18	4	2	34	13	12
	20.3	8.8	35.9	37.3	13.0	18.5	32.6	10.8	21.4	41.9	50.0	33.3	28.3	14.0	15.6
OTHER	30	17	6	4	11	10	9	18	8	3	1		10	15	5
	10.2	10.6	9.4	7.8	11.0	8.4	19.6	12.9	8.2	7.0	12.5		8.3	16.1	6.5
NOT REPORTED	18	12	4	1	7	6	1	9	7	1		1	6	5	7
	6.1	7.5	6.3	2.0	7.0	5.0	2.2	6.5	7.1	2.3		16.7	5.0	5.4	9.1
KEY PLAYER															
MIS/DP	89	54	17	13	36	32	15	52	27	9	1		40	25	23
	30.2	33.8	26.6	25.5	36.0	26.9	32.6	37.4	27.6	20.9	12.5		33.3	26.9	29.9
END-USER DEPARTMENT	50	27	9	13	15	27	5	21	17	7	2	3	21	17	12
	16.9	16.9	14.1	25.5	15.0	22.7	10.9	15.1	17.3	16.3	25.0	50.0	17.5	18.3	15.6
INFORMATION CENTER	21	3	12	4	6	3	8	2	12	6	1		10	5	6
	7.1	1.9	18.8	7.8	6.0	2.5	17.4	1.4	12.2	14.0	12.5		8.3	5.4	7.8
OTHER	31	21	3	4	11	10	7	16	8	5	2		9	14	7
	10.5	13.1	4.7	7.8	11.0	8.4	15.2	11.5	8.2	11.6	25.0		7.5	15.1	9.1
NONE REPORTED	104	55	23	17	32	47	11	48	34	16	2	3	40	32	29
	35.3	34.4	35.9	33.3	32.0	39.5	23.9	34.5	34.7	37.2	25.0	50.0	33.3	34.4	37.7

Chart 22

NECESSARY AUTHORIZATION FOR...
PURCHASE OF TRAINING MODULES/MATERIALS, OR SIGNING TRAINING AGREEMENTS WITH OUTSIDE VENDORS

		ANNUAL SALES			BUSINESS CATEGORY			WORKSITE POPULATION					WORKSITE DESCRIPTION		
	TOTAL	LESS THAN $100 MILLION	$100 TO $500 MILLION	MORE THAN $500 MILLION	MANUFACTURER	SERVICE PROVIDER	OTHER	FEWER THAN 250	250 TO 999	1000 TO 2499	2500 TO 5000	OVER 5000	CORPORATE HEAD QUARTERS MULTI-UNIT ORGANIZATION	DIVISION SUBSIDIARY BRANCH LARGER ORGANIZATION	ORGANIZATION WITH ALL MAJOR UNITS IN ONE LOCATION
BASE- TOTAL RESPONDENTS	295	160	64	51	100	119	46	139	98	43	8	6	120	93	77
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MIS/DP	168	92	39	26	64	60	27	79	57	26	5	1	74	51	39
	56.9	57.5	60.9	51.0	64.0	50.4	58.7	56.8	58.2	60.5	62.5	16.7	61.7	54.8	50.6
END-USER DEPARTMENT	88	51	16	16	34	34	10	40	32	10	5	1	31	35	21
	29.8	31.9	25.0	31.4	34.0	28.6	21.7	28.8	32.7	23.3	62.5	16.7	25.8	37.6	27.3
INFORMATION CENTER	59	12	19	23	13	27	10	14	21	15	5	4	31	18	10
	20.0	7.5	29.7	45.1	13.0	22.7	21.7	10.1	21.4	34.9	62.5	66.7	25.8	19.4	13.0
OTHER	43	21	11	5	11	17	10	23	12	7	1		10	18	14
	14.6	13.1	17.2	9.8	11.0	14.3	21.7	16.5	12.2	16.3	12.5		8.3	19.4	18.2
NOT REPORTED	34	24	6	1	10	13	8	22	7	3		1	12	10	11
	11.5	15.0	9.4	2.0	10.0	10.9	17.4	15.8	7.1	7.0		16.7	10.0	10.8	14.3
KEY PLAYER															
MIS/DP	90	51	22	13	36	33	12	45	31	13	1		38	27	24
	30.5	31.9	34.4	25.5	36.0	27.7	26.1	32.4	31.6	30.2	12.5		31.7	29.0	31.2
END-USER DEPARTMENT	26	13	6	6	9	14	3	14	9	1	1	1	11	10	5
	8.8	8.1	9.4	11.8	9.0	11.8	6.5	10.1	9.2	2.3	12.5	16.7	9.2	10.8	6.5
INFORMATION CENTER	14	4	5	3	4	3	4	3	5	3	2	1	8	4	2
	4.7	2.5	7.8	5.9	4.0	2.5	8.7	2.2	5.1	7.0	25.0	16.7	6.7	4.3	2.6
OTHER	40	23	6	8	11	16	9	18	10	9	3		12	16	11
	13.6	14.4	9.4	15.7	11.0	13.4	19.6	12.9	10.2	20.9	37.5		10.0	17.2	14.3
NONE REPORTED	125	69	25	21	40	53	18	59	43	17	1	4	51	36	35
	42.4	43.1	39.1	41.2	40.0	44.5	39.1	42.4	43.9	39.5	12.5	66.7	42.5	38.7	45.5

Chart 23

1988 AMA REPORT ON END-USER COMPUTING

SECTION 2: DEPARTMENTAL COMPUTING

NECESSARY AUTHORIZATION FOR...
OUTSIDE CONSULTANCIES FOR SPECIAL APPLICATIONS DEVELOPMENT

		ANNUAL SALES			BUSINESS CATEGORY			WORKSITE POPULATION					WORKSITE DESCRIPTION		
	TOTAL	LESS THAN $100 MIL-LION	$100 TO $500 MIL-LION	MORE THAN $500 MIL-LION	MANU-FACT-URER	SER-VICE PRO-VIDER	OTHER	FEWER THAN 250	250 TO 999	1000 TO 2499	2500 TO 5000	OVER 5000	CORP-ORATE HEAD QUARTERS MULTI-UNIT ORGANI-ZATION	DIVISION SUB-SIDIARY BRANCH LARGER ORGANI-ZATION	ORGANI-ZATION WITH ALL MAJOR UNITS IN ONE LOCATION
BASE- TOTAL RESPONDENTS	295	160	64	51	100	119	46	139	98	43	8	6	120	93	77
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MIS/DP	186	90	51	33	60	76	27	79	63	36	5	2	82	50	51
	63.1	56.3	79.7	64.7	60.0	63.9	58.7	56.8	64.3	83.7	62.5	33.3	68.3	53.8	66.2
END-USER DEPARTMENT	95	46	18	27	35	36	13	38	35	14	4	4	40	33	21
	32.2	28.8	28.1	52.9	35.0	30.3	28.3	27.3	35.7	32.6	50.0	66.7	33.3	35.5	27.3
INFORMATION CENTER	29	6	12	9	10	12	5	8	12	6	2	1	14	11	4
	9.8	3.8	18.8	17.6	10.0	10.1	10.9	5.8	12.2	14.0	25.0	16.7	11.7	11.8	5.2
OTHER	28	13	6	3	9	10	5	15	6	5	2		7	14	7
	9.5	8.1	9.4	5.9	9.0	8.4	10.9	10.8	6.1	11.6	25.0		5.8	15.1	9.1
NOT REPORTED	44	33	5	3	17	15	8	25	15	2	1	1	17	14	11
	14.9	20.6	7.8	5.9	17.0	12.6	17.4	18.0	15.3	4.7	12.5	16.7	14.2	15.1	14.3
KEY PLAYER															
MIS/DP	99	54	25	16	31	37	19	41	36	20	1		43	24	30
	33.6	33.8	39.1	31.4	31.0	31.1	41.3	29.5	36.7	46.5	12.5		35.8	25.8	39.0
END-USER DEPARTMENT	23	11	5	7	9	11	3	11	7	2	2	1	9	10	4
	7.8	6.9	7.8	13.7	9.0	9.2	6.5	7.9	7.1	4.7	25.0	16.7	7.5	10.8	5.2
INFORMATION CENTER	7	2	3	1	2	2	3	4	2		1		4	3	
	2.4	1.3	4.7	2.0	2.0	1.7	6.5	2.9	2.0		12.5		3.3	3.2	
OTHER	30	20	2	3	11	10	4	17	5	5	3		5	14	10
	10.2	12.5	3.1	5.9	11.0	8.4	8.7	12.2	5.1	11.6	37.5		4.2	15.1	13.0
NONE REPORTED	136	73	29	24	47	59	17	66	48	16	1	5	59	42	33
	46.1	45.6	45.3	47.1	47.0	49.6	37.0	47.5	49.0	37.2	12.5	83.3	49.2	45.2	42.9

Chart 24

1988 AMA REPORT ON END-USER COMPUTING

SECTION 2: DEPARTMENTAL COMPUTING

DEPARTMENT RESPONSIBLE FOR DEPARTMENT BUDGETING & FINANCIAL MANAGEMENT

		ANNUAL SALES			BUSINESS CATEGORY			WORKSITE POPULATION					WORKSITE DESCRIPTION		
	TOTAL	LESS THAN $100 MIL-LION	$100 TO $500 MIL-LION	MORE THAN $500 MIL-LION	MANU-FACT-URER	SER-VICE PRO-VIDER	OTHER	FEWER THAN 250	250 TO 999	1000 TO 2499	2500 TO 5000	OVER 5000	CORP-ORATE HEAD QUARTERS MULTI-UNIT ORGANI-ZATION	DIVISION SUB-SIDIARY BRANCH LARGER ORGANI-ZATION	ORGANI-ZATION WITH ALL MAJOR UNITS IN ONE LOCATION
BASE- TOTAL RESPONDENTS	295	160	64	51	100	119	46	139	98	43	8	6	120	93	77
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MIS/DP	51	27	10	9	18	16	10	25	15	8	3		24	17	9
	17.3	16.9	15.6	17.6	18.0	13.4	21.7	18.0	15.3	18.6	37.5		20.0	18.3	11.7
END-USER DEPARTMENT	129	73	24	23	48	51	15	59	46	17	1	5	58	35	33
	43.7	45.6	37.5	45.1	48.0	42.9	32.6	42.4	46.9	39.5	12.5	83.3	48.3	37.6	42.9
SHARED	88	40	26	17	23	40	16	37	27	20	3	1	33	25	27
	29.8	25.0	40.6	33.3	23.0	33.6	34.8	26.6	27.6	46.5	37.5	16.7	27.5	26.9	35.1
NO ASSIGNED RESPONSIBILITY	12	11		1	5	5	1	6	6				1	7	4
	4.1	6.9		2.0	5.0	4.2	2.2	4.3	6.1				.8	7.5	5.2
NOT REPORTED	31	18	7	2	10	12	7	19	9	2	1		11	12	8
	10.5	11.3	10.9	3.9	10.0	10.1	15.2	13.7	9.2	4.7	12.5		9.2	12.9	10.4

Chart 25

1988 AMA REPORT ON END-USER COMPUTING

SECTION 2: DEPARTMENTAL COMPUTING

DEPARTMENT RESPONSIBLE FOR DEPARTMENTAL REPORT WRITING

		ANNUAL SALES			BUSINESS CATEGORY			WORKSITE POPULATION					WORKSITE DESCRIPTION		
	TOTAL	LESS THAN $100 MIL-LION	$100 TO $500 MIL-LION	MORE THAN $500 MIL-LION	MANU-FACT-URER	SER-VICE PRO-VIDER	OTHER	FEWER THAN 250	250 TO 999	1000 TO 2499	2500 TO 5000	OVER 5000	CORP-ORATE HEAD QUARTERS MULTI-UNIT ORGANI-ZATION	DIVISION SUB-SIDIARY BRANCH LARGER ORGANI-ZATION	ORGANI-ZATION WITH ALL MAJOR UNITS IN ONE LOCATION
BASE- TOTAL RESPONDENTS	295	160	64	51	100	119	46	139	98	43	8	6	120	93	77
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MIS/DP	68	44	8	9	25	25	11	40	19	7	2		23	25	19
	23.1	27.5	12.5	17.6	25.0	21.0	23.9	28.8	19.4	16.3	25.0		19.2	26.9	24.7
END-USER DEPARTMENT	120	63	25	26	45	53	12	48	47	16	4	5	56	32	30
	40.7	39.4	39.1	51.0	45.0	44.5	26.1	34.5	48.0	37.2	50.0	83.3	46.7	34.4	39.0
SHARED	83	35	24	19	30	30	12	33	26	19	2	2	40	22	18
	28.1	21.9	37.5	37.3	30.0	25.2	26.1	23.7	26.5	44.2	25.0	33.3	33.3	23.7	23.4
NO ASSIGNED RESPONSIBILITY	20	16	1	1	1	11	5	14	5	1			3	8	8
	6.8	10.0	1.6	2.0	1.0	9.2	10.9	10.1	5.1	2.3			2.5	8.6	10.4
NOT REPORTED	25	14	7	1	6	10	7	14	7	3	1		9	9	7
	8.5	8.8	10.9	2.0	6.0	8.4	15.2	10.1	7.1	7.0	12.5		7.5	9.7	9.1

Chart 26

1988 AMA REPORT ON END-USER COMPUTING

DEPARTMENT RESPONSIBLE FOR DEPARTMENTAL PROJECT MANAGEMENT

SECTION 2: DEPARTMENTAL COMPUTING

		ANNUAL SALES			BUSINESS CATEGORY			WORKSITE POPULATION					WORKSITE DESCRIPTION		
	TOTAL	LESS THAN $100 MILLION	$100 TO $500 MILLION	MORE THAN $500 MILLION	MANUFACTURER	SERVICE PROVIDER	OTHER	FEWER THAN 250	250 TO 999	1000 TO 2499	2500 TO 5000	OVER 5000	CORPORATE HEAD QUARTERS MULTI-UNIT ORGANIZATION	DIVISION SUBSIDIARY BRANCH LARGER ORGANIZATION	ORGANIZATION WITH ALL MAJOR UNITS IN ONE LOCATION
BASE- TOTAL RESPONDENTS	295 100.0	160 100.0	64 100.0	51 100.0	100 100.0	119 100.0	46 100.0	139 100.0	98 100.0	43 100.0	8 100.0	6 100.0	120 100.0	93 100.0	77 100.0
MIS/DP	49 16.6	30 18.8	6 9.4	7 13.7	13 13.0	15 12.6	13 28.3	30 21.6	13 13.3	3 7.0	1 12.5	1 16.7	21 17.5	15 16.1	11 14.3
END-USER DEPARTMENT	136 46.1	71 44.4	26 40.6	32 62.7	55 55.0	58 48.7	13 28.3	58 41.7	48 49.0	22 51.2	4 50.0	4 66.7	57 47.5	43 46.2	35 45.5
SHARED	63 21.4	28 17.5	16 25.0	12 23.5	16 16.0	25 21.0	11 23.9	24 17.3	22 22.4	12 27.9	2 25.0	3 50.0	31 25.8	14 15.1	16 20.8
NO ASSIGNED RESPONSIBILITY	27 9.2	18 11.3	7 10.9	1 2.0	7 7.0	14 11.8	3 6.5	17 12.2	6 6.1	4 9.3			8 6.7	11 11.8	8 10.4
NOT REPORTED	34 11.5	21 13.1	9 14.1	1 2.0	12 12.0	12 10.1	8 17.4	17 12.2	12 12.2	4 9.3	1 12.5		12 10.0	13 14.0	9 11.7

Chart 27

1988 AMA REPORT ON END-USER COMPUTING

SECTION 2: DEPARTMENTAL COMPUTING

DEPARTMENT RESPONSIBLE FOR DEPARTMENTAL WORD PROCESSING

		ANNUAL SALES			BUSINESS CATEGORY			WORKSITE POPULATION					WORKSITE DESCRIPTION		
	TOTAL	LESS THAN $100 MIL-LION	$100 TO $500 MIL-LION	MORE THAN $500 MIL-LION	MANU-FACT-URER	SER-VICE PRO-VIDER	OTHER	FEWER THAN 250	250 TO 999	1000 TO 2499	2500 TO 5000	OVER 5000	CORP-ORATE HEAD QUARTERS MULTI-UNIT ORGANI-ZATION	DIVISION SUB-SIDIARY BRANCH LARGER ORGANI-ZATION	ORGANI-ZATION WITH ALL MAJOR UNITS IN ONE LOCATION
BASE- TOTAL RESPONDENTS	295	160	64	51	100	119	46	139	98	43	8	6	120	93	77
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MIS/DP	30	16	2	6	5	11	9	17	7	5	1		16	10	4
	10.2	10.0	3.1	11.8	5.0	9.2	19.6	12.2	7.1	11.6	12.5		13.3	10.8	5.2
END-USER DEPARTMENT	179	95	40	36	66	75	24	75	68	24	7	5	71	58	48
	60.7	59.4	62.5	70.6	66.0	63.0	52.2	54.0	69.4	55.8	87.5	83.3	59.2	62.4	62.3
SHARED	61	32	16	9	22	23	7	30	16	13		2	27	13	20
	20.7	20.0	25.0	17.6	22.0	19.3	15.2	21.6	16.3	30.2		33.3	22.5	14.0	26.0
NO ASSIGNED RESPONSIBILITY	14	12	2		1	8	4	10	2	1			3	6	3
	4.7	7.5	3.1		1.0	6.7	8.7	7.2	2.0	2.3			2.5	6.5	3.9
NOT REPORTED	24	13	6	2	7	10	5	14	7	2	1		11	10	3
	8.1	8.1	9.4	3.9	7.0	8.4	10.9	10.1	7.1	4.7	12.5		9.2	10.8	3.9

Chart 28

1988 AMA REPORT ON END-USER COMPUTING

DEPARTMENT RESPONSIBLE FOR PRESENTATION GRAPHICS

SECTION 2: DEPARTMENTAL COMPUTING

		ANNUAL SALES			BUSINESS CATEGORY			WORKSITE POPULATION					WORKSITE DESCRIPTION		
	TOTAL	LESS THAN $100 MIL-LION	$100 TO $500 MIL-LION	MORE THAN $500 MIL-LION	MANU-FACT-URER	SER-VICE PRO-VIDER	OTHER	FEWER THAN 250	250 TO 999	1000 TO 2499	2500 TO 5000	OVER 5000	CORP-ORATE HEAD QUARTERS MULTI-UNIT ORGANI-ZATION	DIVISION SUB-SIDIARY BRANCH LARGER ORGANI-ZATION	ORGANI-ZATION WITH ALL MAJOR UNITS IN ONE LOCATION
BASE- TOTAL RESPONDENTS	295	160	64	51	100	119	46	139	98	43	8	6	120	93	77
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MIS/DP	31	18	5	6	5	15	5	21	6	3	1		13	8	9
	10.5	11.3	7.8	11.8	5.0	12.6	10.9	15.1	6.1	7.0	12.5		10.8	8.6	11.7
END-USER DEPARTMENT	130	62	31	30	44	53	21	53	45	22	6	4	59	40	29
	44.1	38.8	48.4	58.8	44.0	44.5	45.7	38.1	45.9	51.2	75.0	66.7	49.2	43.0	37.7
SHARED	63	29	15	15	25	24	7	24	19	16	1	3	29	15	17
	21.4	18.1	23.4	29.4	25.0	20.2	15.2	17.3	19.4	37.2	12.5	50.0	24.2	16.1	22.1
NO ASSIGNED RESPONSIBILITY	44	34	5	1	13	21	6	28	12	3			14	19	10
	14.9	21.3	7.8	2.0	13.0	17.6	13.0	20.1	12.2	7.0			11.7	20.4	13.0
NOT REPORTED	44	26	10	2	15	15	10	23	17	3	1		14	14	16
	14.9	16.3	15.6	3.9	15.0	12.6	21.7	16.5	17.3	7.0	12.5		11,7	15.1	20.8

Chart 29

1988 AMA REPORT ON END-USER COMPUTING

SECTION 2: DEPARTMENTAL COMPUTING

DEPARTMENT RESPONSIBLE FOR DEPARTMENTAL LIST PROCESSING

		ANNUAL SALES			BUSINESS CATEGORY			WORKSITE POPULATION					WORKSITE DESCRIPTION		
	TOTAL	LESS THAN $100 MIL-LION	$100 TO $500 MIL-LION	MORE THAN $500 MIL-LION	MANU-FACT-URER	SER-VICE PRO-VIDER	OTHER	FEWER THAN 250	250 TO 999	1000 TO 2499	2500 TO 5000	OVER 5000	CORP-ORATE HEAD QUARTERS MULTI-UNIT ORGANI-ZATION	DIVISION SUB-SIDIARY BRANCH LARGER ORGANI-ZATION	ORGANI-ZATION WITH ALL MAJOR UNITS IN ONE LOCATION
BASE- TOTAL RESPONDENTS	295	160	64	51	100	119	46	139	98	43	8	6	120	93	77
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MIS/DP	53	28	10	10	21	18	9	26	20	6	1		25	17	11
	18.0	17.5	15.6	19.6	21.0	15.1	19.6	18.7	20.4	14.0	12.5		20.8	18.3	14.3
END-USER DEPARTMENT	116	60	23	26	48	44	11	48	42	15	7	4	48	39	28
	39.3	37.5	35.9	51.0	48.0	37.0	23.9	34.5	42.9	34.9	87.5	66.7	40.0	41.9	36.4
SHARED	60	33	13	10	15	26	12	31	11	16		2	26	13	19
	20.3	20.6	20.3	19.6	15.0	21.8	26.1	22.3	11.2	37.2		33.3	21.7	14.0	24.7
NO ASSIGNED RESPONSIBILITY	28	21	6	1	9	14	3	14	10	3			8	12	7
	9.5	13.1	9.4	2.0	9.0	11.8	6.5	10.1	10.2	7.0			6.7	12.9	9.1
NOT REPORTED	49	26	13	6	14	21	11	25	19	4	1		18	17	13
	16.6	16.3	20.3	11.8	14.0	17.6	23.9	18.0	19.4	9.3	12.5		15.0	18.3	16.9

Chart 30

1988 AMA REPORT ON END-USER COMPUTING

SECTION 2: DEPARTMENTAL COMPUTING

DEPARTMENT RESPONSIBLE FOR COMPUTER AIDED DESIGN & PRODUCTION

		ANNUAL SALES			BUSINESS CATEGORY			WORKSITE POPULATION					WORKSITE DESCRIPTION		
	TOTAL	LESS THAN $100 MIL-LION	$100 TO $500 MIL-LION	MORE THAN $500 MIL-LION	MANU-FACT-URER	SER-VICE PRO-VIDER	OTHER	FEWER THAN 250	250 TO 999	1000 TO 2499	2500 TO 5000	OVER 5000	CORP-ORATE HEAD QUARTERS MULTI-UNIT ORGANI-ZATION	DIVISION SUB-SIDIARY BRANCH LARGER ORGANI-ZATION	ORGANI-ZATION WITH ALL MAJOR UNITS IN ONE LOCATION
BASE- TOTAL RESPONDENTS	295	160	64	51	100	119	46	139	98	43	8	6	120	93	77
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MIS/DP	39	18	7	9	7	19	7	19	8	7	2	3	15	13	10
	13.2	11.3	10.9	17.6	7.0	16.0	15.2	13.7	8.2	16.3	25.0	50.0	12.5	14.0	13.0
END-USER DEPARTMENT	87	44	23	16	44	26	10	30	42	12	3		37	33	16
	29.5	27.5	35.9	31.4	44.0	21.8	21.7	21.6	42.9	27.9	37.5		30.8	35.5	20.8
SHARED	37	13	13	10	16	13	6	14	12	8	1	2	16	10	11
	12.5	8.1	20.3	19.6	16.0	10.9	13.0	10.1	12.2	18.6	12.5	33.3	13.3	10.8	14.3
NO ASSIGNED RESPONSIBILITY	60	42	7	9	12	34	9	39	14	6		1	24	22	14
	20.3	26.3	10.9	17.6	12.0	28.6	19.6	28.1	14.3	14.0		16.7	20.0	23.7	18.2
NOT REPORTED	81	48	14	11	23	33	15	41	25	11	3		33	19	26
	27.5	30.0	21.9	21.6	23.0	27.7	32.6	29.5	25.5	25.6	37.5		27.5	20.4	33.8

Chart 31

1988 ANA REPORT ON END-USER COMPUTING

SECTION 2: DEPARTMENTAL COMPUTING

DEPARTMENT RESPONSIBLE FOR AUTOMATED LINKS WITH OTHER ORGANIZATIONAL WORKSITES

		ANNUAL SALES			BUSINESS CATEGORY			WORKSITE POPULATION					WORKSITE DESCRIPTION		
	TOTAL	LESS THAN $100 MIL-LION	$100 TO $500 MIL-LION	MORE THAN $500 MIL-LION	MANU-FACT-URER	SER-VICE PRO-VIDER	OTHER	FEWER THAN 250	250 TO 999	1000 TO 2499	2500 TO 5000	OVER 5000	CORP-ORATE HEAD QUARTERS MULTI-UNIT ORGANI-ZATION	DIVISION SUB-SIDIARY BRANCH LARGER ORGANI-ZATION	ORGANI-ZATION WITH ALL MAJOR UNITS IN ONE LOCATION
BASE- TOTAL RESPONDENTS	295	160	64	51	100	119	46	139	98	43	8	6	120	93	77
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MIS/DP	152	77	34	30	49	64	22	72	51	23	2	3	63	52	35
	51.5	48.1	53.1	58.8	49.0	53.8	47.8	51.8	52.0	53.5	25.0	50.0	52.5	55.9	45.5
END-USER DEPARTMENT	21	13	2	5	10	8	1	9	11		1		8	7	5
	7.1	8.1	3.1	9.8	10.0	6.7	2.2	6.5	11.2		12.5		6.7	7.5	6.5
SHARED	38	13	13	11	11	16	6	12	13	12	1		15	14	8
	12.9	8.1	20.3	21.6	11.0	13.4	13.0	8.6	13.3	27.9	12.5		12.5	15.1	10.4
NO ASSIGNED RESPONSIBILITY	30	19	5	3	13	10	3	17	6	4	1	2	11	7	12
	10.2	11.9	7.8	5.9	13.0	8.4	6.5	12.2	6.1	9.3	12.5	33.3	9.2	7.5	15.6
NOT REPORTED	65	44	10	7	25	22	15	33	23	5	3	1	28	16	20
	22.0	27.5	15.6	13.7	25.0	18.5	32.6	23.7	23.5	11.6	37.5	16.7	23.3	17.2	26.0

Chart 32

1988 AMA REPORT ON END-USER COMPUTING

SECTION 2: DEPARTMENTAL COMPUTING

DEPARTMENT RESPONSIBLE FOR AUTOMATED LINKS WITH CUSTOMERS/ SUPPLIERS

		ANNUAL SALES			BUSINESS CATEGORY			WORKSITE POPULATION					WORKSITE DESCRIPTION		
	TOTAL	LESS THAN $100 MIL-LION	$100 TO $500 MIL-LION	MORE THAN $500 MIL-LION	MANU-FACT-URER	SER-VICE PRO-VIDER	OTHER	FEWER THAN 250	250 TO 999	1000 TO 2499	2500 TO 5000	OVER 5000	CORP-ORATE HEAD QUARTERS MULTI-UNIT ORGANI-ZATION	DIVISION SUB-SIDIARY BRANCH LARGER ORGANI-ZATION	ORGANI-ZATION WITH ALL MAJOR UNITS IN ONE LOCATION
BASE- TOTAL RESPONDENTS	295	160	64	51	100	119	46	139	98	43	8	6	120	93	77
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MIS/DP	100	49	24	19	38	36	14	44	37	15	2	2	41	34	24
	33.9	30.6	37.5	37.3	38.0	30.3	30.4	31.7	37.8	34.9	25.0	33.3	34.2	36.6	31.2
END-USER DEPARTMENT	28	15	4	8	8	13	4	11	11	4	1	1	11	8	8
	9.5	9.4	6.3	15.7	8.0	10.9	8.7	7.9	11.2	9.3	12.5	16.7	9.2	8.6	10.4
SHARED	35	14	11	9	14	11	4	13	9	10	1	1	12	13	8
	11.9	8.8	17.2	17.6	14.0	9.2	8.7	9.4	9.2	23.3	12.5	16.7	10.0	14.0	10.4
NO ASSIGNED RESPONSIBILITY	59	38	12	6	16	31	7	31	20	6	1	1	22	21	16
	20.0	23.8	18.8	11.8	16.0	26.1	15.2	22.3	20.4	14.0	12.5	16.7	18.3	22.6	20.8
NOT REPORTED	80	48	13	12	28	30	18	43	23	10	3	1	36	20	23
	27.1	30.0	20.3	23.5	28.0	25.2	39.1	30.9	23.5	23.3	37.5	16.7	30.0	21.5	29.9

Chart 33

1988 AMA REPORT ON END-USER COMPUTING

SECTION 3: DEPARTMENTAL COMPUTING

DEPARTMENT RESPONSIBLE FOR AUTOMATED LINKS WITH CUSTOMERS/ SUPPLIERS

		ANNUAL SALES			BUSINESS CATEGORY			WORKSITE POPULATION					WORKSITE DESCRIPTION		
	TOTAL	LESS THAN $100 MIL-LION	$100 TO $500 MIL-LION	MORE THAN $500 MIL-LION	MANU-FACT-URER	SER-VICE PRO-VIDER	OTHER	FEWER THAN 250	250 TO 999	1000 TO 2499	2500 TO 5000	OVER 5000	CORP-ORATE HEAD QUARTERS MULTI-UNIT ORGANI-ZATION	DIVISION SUB-SIDIARY BRANCH LARGER ORGANI-ZATION	ORGANI-ZATION WITH ALL MAJOR UNITS IN ONE LOCATION
BASE- TOTAL RESPONDENTS	295 100.0	160 100.0	64 100.0	51 100.0	100 100.0	119 100.0	46 100.0	139 100.0	98 100.0	43 100.0	8 100.0	6 100.0	120 100.0	93 100.0	77 100.0
MIS/DP	100 33.9	49 30.6	24 37.5	19 37.3	38 38.0	36 30.3	14 30.4	44 31.7	37 37.8	15 34.9	2 25.0	2 33.3	41 34.2	34 36.6	24 31.2
END-USER DEPARTMENT	28 9.5	15 9.4	4 6.3	8 15.7	8 8.0	13 10.9	4 8.7	11 7.9	11 11.2	4 9.3	1 12.5	1 16.7	11 9.2	8 8.6	8 10.4
SHARED	35 11.9	14 8.8	11 17.2	9 17.6	14 14.0	11 9.2	4 8.7	13 9.4	9 9.2	10 23.3	1 12.5	1 16.7	12 10.0	13 14.0	8 10.4
NO ASSIGNED RESPONSIBILITY	59 20.0	38 23.8	12 18.8	6 11.8	16 16.0	31 26.1	7 15.2	31 22.3	20 20.4	6 14.0	1 12.5	1 16.7	22 18.3	21 22.6	16 20.8
NOT REPORTED	80 27.1	48 30.0	13 20.3	12 23.5	28 28.0	30 25.2	18 39.1	43 30.9	23 23.5	10 23.3	3 37.5	1 16.7	36 30.0	20 21.5	23 29.9

Chart 34

1988 AMA REPORT ON END-USER
COMPUTING

DEPARTMENT RESPONSIBLE FOR BACK-UP SECURITY

SECTION 2: DEPARTMENTAL COMPUTING

		ANNUAL SALES			BUSINESS CATEGORY			WORKSITE POPULATION					WORKSITE DESCRIPTION		
	TOTAL	LESS THAN $100 MIL-LION	$100 TO $500 MIL-LION	MORE THAN $500 MIL-LION	MANU-FACT-URER	SER-VICE PRO-VIDER	OTHER	FEWER THAN 250	250 TO 999	1000 TO 2499	2500 TO 5000	OVER 5000	CORP-ORATE HEAD QUARTERS MULTI-UNIT ORGANI-ZATION	DIVISION SUB-SIDIARY BRANCH LARGER ORGANI-ZATION	ORGANI-ZATION WITH ALL MAJOR UNITS IN ONE LOCATION
BASE- TOTAL RESPONDENTS	295 100.0	160 100.0	64 100.0	51 100.0	100 100.0	119 100.0	46 100.0	139 100.0	98 100.0	43 100.0	8 100.0	6 100.0	120 100.0	93 100.0	77 100.0
MIS/DP	173 58.6	105 65.6	33 51.6	25 49.0	65 65.0	63 52.9	30 65.2	92 66.2	58 59.2	18 41.9	3 37.5	1 16.7	75 62.5	50 53.8	43 55.8
END-USER DEPARTMENT	41 13.9	18 11.3	9 14.1	13 25.5	11 11.0	21 17.6	4 8.7	15 10.8	11 11.2	9 20.9	4 50.0	2 33.3	16 13.3	16 17.2	9 11.7
SHARED	57 19.3	23 14.4	14 21.9	14 27.5	16 16.0	26 21.8	8 17.4	17 12.2	20 20.4	16 37.2	2 25.0	2 33.3	25 20.8	17 18.3	15 19.5
NO ASSIGNED RESPONSIBILITY	8 2.7	5 3.1		2 3.9	2 2.0	4 3.4	1 2.2	6 4.3	2 2.0					6 6.5	2 2.6
NOT REPORTED	34 11.5	18 11.3	10 15.6	4 7.8	11 11.0	15 12.6	5 10.9	15 10.8	12 12.2	4 9.3	1 12.5	2 33.3	16 13.3	9 9.7	9 11.7

Chart 35

1988 AMA REPORT ON END-USER COMPUTING

SECTION 2: DEPARTMENTAL COMPUTING

NUMBER OF END-USERS HAVING DIRECT ACCESS TO ONLINE DATABASES

		ANNUAL SALES			BUSINESS CATEGORY			WORKSITE POPULATION					WORKSITE DESCRIPTION		
	TOTAL	LESS THAN $100 MILLION	$100 TO $500 MILLION	MORE THAN $500 MILLION	MANUFACTURER	SERVICE PROVIDER	OTHER	FEWER THAN 250	250 TO 999	1000 TO 2499	2500 TO 5000	OVER 5000	CORPORATE HEADQUARTERS MULTI-UNIT ORGANIZATION	DIVISION SUBSIDIARY BRANCH LARGER ORGANIZATION	ORGANIZATION WITH ALL MAJOR UNITS IN ONE LOCATION
BASE- TOTAL RESPONDENTS	295	160	64	51	100	119	46	139	98	43	8	6	120	93	77
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
NONE	50	33	10	5	22	17	7	23	19	6	1	1	17	15	18
	16.9	20.6	15.6	9.8	22.0	14.3	15.2	16.5	19.4	14.0	12.5	16.7	14.2	16.1	23.4
1-2	25	15	7	2	12	9	1	18	5		1		9	7	7
	8.5	9.4	10.9	3.9	12.0	7.6	2.2	12.9	5.1		12.5		7.5	7.5	9.1
3-4	24	16	2	3	8	11	2	14	6	3		1	15	4	5
	8.1	10.0	3.1	5.9	8.0	9.2	4.3	10.1	6.1	7.0		16.7	12.5	4.3	6.5
5-9	23	9	5	6	9	6	6	9	10	3		1	10	8	5
	7.8	5.6	7.8	11.8	9.0	5.0	13.0	6.5	10.2	7.0		16.7	8.3	8.6	6.5
10-24	26	13	4	8	7	12	4	14	10	1		1	12	9	4
	8.8	8.1	6.3	15.7	7.0	10.1	8.7	10.1	10.2	2.3		16.7	10.0	9.7	5.2
25-49	17	8	4	4	7	7	2	6	6	4		1	5	5	7
	5.8	5.0	6.3	7.8	7.0	5.9	4.3	4.3	6.1	9.3		16.7	4.2	5.4	9.1
50 OR MORE	48	22	15	9	11	23	10	11	19	15	3		22	18	8
	16.3	13.8	23.4	17.6	11.0	19.3	21.7	7.9	19.4	34.9	37.5		18.3	19.4	10.4
NOT REPORTED	82	44	17	14	24	34	14	44	23	11	3	1	30	27	23
	27.8	27.5	26.6	27.5	24.0	28.6	30.4	31.7	23.5	25.6	37.5	16.7	25.0	29.0	29.9
AVERAGE NUMBER (INCLUDING NONE)	58	32	89	115	19	105	49	35	43	141	280	9	72	74	19
STANDARD DEVIATION	156	83	184	260	37	229	83	129	87	250	305	9	188	165	36
STANDARD ERROR	10.7	7.7	26.9	42.8	4.2	24.9	14.7	13.2	10.1	44.2	136.8	4.0	19.8	20.3	4.9
AVERAGE NUMBER (EXCLUDING NONE)	76	45	113	133	27	131	62	46	57	173	351	12	89	96	29
STANDARD DEVIATION	174	95	201	275	41	250	90	146	97	267	302	7	205	182	40
STANDARD ERROR	13.6	10.5	33.1	48.7	5.6	30.3	18.0	17.2	13.0	52.5	151.4	3.8	24.0	25.5	6.8

Chart 36

1988 AMA REPORT ON END-USER COMPUTING

SPECIFIC ONLINE DATABASES SUBSCRIBE TO

SECTION 2: DEPARTMENTAL COMPUTING

		ANNUAL SALES			BUSINESS CATEGORY			WORKSITE POPULATION					WORKSITE DESCRIPTION		
	TOTAL	LESS THAN $100 MILLION	$100 TO $500 MILLION	MORE THAN $500 MILLION	MANUFACTURER	SERVICE PROVIDER	OTHER	FEWER THAN 250	250 TO 999	1000 TO 2499	2500 TO 5000	OVER 5000	CORPORATE HEAD QUARTERS MULTI-UNIT ORGANIZATION	DIVISION SUBSIDIARY BRANCH LARGER ORGANIZATION	ORGANIZATION WITH ALL MAJOR UNITS IN ONE LOCATION
BASE- TOTAL RESPONDENTS	295 100.0	160 100.0	64 100.0	51 100.0	100 100.0	119 100.0	46 100.0	139 100.0	98 100.0	43 100.0	8 100.0	6 100.0	120 100.0	93 100.0	77 100.0
COMPUSERVE	61 20.7	21 13.1	15 23.4	20 39.2	16 16.0	31 26.1	8 17.4	24 17.3	19 19.4	14 32.6	1 12.5	3 50.0	34 28.3	17 18.3	8 10.4
COMPUSTAT	10 3.4	3 1.9	3 4.7	4 7.8	2 2.0	7 5.9	1 2.2	5 3.6	4 4.1	1 2.3			3 2.5	4 4.3	3 3.9
DATA RESOURCES	12 4.1	3 1.9	3 4.7	6 11.8	6 6.0	4 3.4		2 1.4	9 9.2	1 2.3			7 5.8	3 3.2	2 2.6
DATEXT	2 .7		1 1.6	1 2.0		2 1.7			1 1.0	1 2.3			2 1.7		
DIALOG INFORMATION SERVICES	24 8.1	14 8.8	6 9.4	4 7.8	9 9.0	13 10.9	1 2.2	8 5.8	12 12.2	4 9.3			13 10.8	9 9.7	2 2.6
DIALOG BUSINESS CONNECTION	11 3.7	5 3.1	3 4.7	3 5.9	1 1.0	10 8.4		3 2.2	6 6.1	2 4.7			7 5.8	2 2.2	2 2.6
DOW-JONES NEWS RETRIEVAL	63 21.4	21 13.1	16 25.0	24 47.1	16 16.0	32 26.9	11 23.9	21 15.1	24 24.5	14 32.6	3 37.5	1 16.7	37 30.8	15 16.1	11 14.3
INVESTEXT	6 2.0	2 1.3	1 1.6	3 5.9	1 1.0	3 2.5	2 4.3	2 1.4	4 4.1				5 4.2		1 1.3
LEWIS/NEXIS/EXCHANGE	47 15.9	13 8.1	14 21.9	17 33.3	9 9.0	27 22.7	6 13.0	11 7.9	17 17.3	15 34.9	4 50.0		24 20.0	14 15.1	9 11.7
NEWSNET	7 2.4	1 .6	2 3.1	4 7.8	2 2.0	3 2.5	2 4.3		5 5.1	2 4.7			4 3.3	3 3.2	
PREDICASTS	4 1.4		1 1.6	3 5.9	1 1.0	2 1.7	1 2.2	1 .7	3 3.1				3 2.5	1 1.1	
VU/TEXT INFORMATION SERVICES	4 1.4	2 1.3	1 1.6	1 2.0	1 1.0	1 .8	1 2.2	1 .7	2 2.0	1 2.3			2 1.7	1 1.1	1 1.3
NOT REPORTED	172 58.3	109 68.1	33 51.6	17 33.3	64 64.0	59 49.6	30 65.2	92 66.2	54 55.1	19 44.2	4 50.0	2 33.3	62 51.7	55 59.1	52 67.5

Chart 37

1988 AMA REPORT ON END-USER COMPUTING

SECTION 5: THE INFORMATION CENTER

STAFFING OF INFORMATION CENTER PROJECTED FOR 1988
* PERSONS, MIS/DP BACKGROUND *

		ANNUAL SALES			BUSINESS CATEGORY			WORKSITE POPULATION					WORKSITE DESCRIPTION		
	TOTAL	LESS THAN $100 MILLION	$100 TO $500 MILLION	MORE THAN $500 MILLION	MANUFACTURER	SERVICE PROVIDER	OTHER	FEWER THAN 250	250 TO 999	1000 TO 2499	2500 TO 5000	OVER 5000	CORPORATE HEAD QUARTERS MULTI-UNIT ORGANIZATION	DIVISION SUB-SIDIARY BRANCH LARGER ORGANIZATION	ORGANIZATION WITH ALL MAJOR UNITS IN ONE LOCATION
BASE- TOTAL RESPONDENTS	295	160	64	51	100	119	46	139	98	43	8	6	120	93	77
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
NONE	6	2	3	1	3	1	1	1	4	1			3	2	1
	2.0	1.3	4.7	2.0	3.0	.8	2.2	.7	4.1	2.3			2.5	2.2	1.3
1	30	19	6	1	8	13	6	14	12	4			13	6	11
	10.2	11.9	9.4	2.0	8.0	10.9	13.0	10.1	12.2	9.3			10.8	6.5	14.3
2	21	12	4	5	7	10	1	8	6	5	1		8	9	3
	7.1	7.5	6.3	9.8	7.0	8.4	2.2	5.8	6.1	11.6	12.5		6.7	9.7	3.9
3	15	5	3	6	3	6	4	7	5	2		1	11	1	3
	5.1	3.1	4.7	11.8	3.0	5.0	8.7	5.0	5.1	4.7		16.7	9.2	1.1	3.9
4	18	9	3	6	5	6	2	6	8	3		1	8	3	7
	6.1	5.6	4.7	11.8	5.0	5.0	4.3	4.3	8.2	7.0		16.7	6.7	3.2	9.1
5-9	24	6	10	7	5	14	3	5	7	8	2	2	16	4	4
	8.1	3.8	15.6	13.7	5.0	11.8	6.5	3.6	7.1	18.6	25.0	33.3	13.3	4.3	5.2
10 OR MORE	12	4	3	4	2	7	3	4	6	1	1		4	6	1
	4.1	2.5	4.7	7.8	2.0	5.9	6.5	2.9	6.1	2.3	12.5		3.3	6.5	1.3
NOT REPORTED	169	103	32	21	67	62	26	94	50	19	4	2	57	62	47
	57.3	64.4	50.0	41.2	67.0	52.1	56.5	67.6	51.0	44.2	50.0	33.3	47.5	66.7	61.0
AVERAGE (INCLUDING NONE)	6	6	8	5	6	8	5	6	6	8	6	5	5	10	3
STANDARD DEVIATION	14	16	17	4	17	16	4	14	12	19	3	1	5	21	2
STANDARD ERROR	1.3	2.2	3.0	.7	2.9	2.2	.9	2.2	1.7	3.9	1.8	.8	.6	3.8	.5
AVERAGE (EXCLUDING NONE)	7	6	8	5	7	8	5	6	7	8	6	5	5	10	3
STANDARD DEVIATION	14	17	18	4	17	16	4	15	12	19	3	1	5	22	2
STANDARD ERROR	1.3	2.2	3.4	.8	3.2	2.2	1.0	2.2	1.8	4.1	1.8	.8	.7	4.1	.5

Chart 38

1988 AMA REPORT ON END-USER
COMPUTING

SECTION 3: THE INFORMATION CENTER

STAFFING OF INFORMATION CENTER PROJECTED FOR 1988
* PERSONS, TRAINING BACKGROUND *

		ANNUAL SALES			BUSINESS CATEGORY			WORKSITE POPULATION					WORKSITE DESCRIPTION		
	TOTAL	LESS THAN $100 MIL-LION	$100 TO $500 MIL-LION	MORE THAN $500 MIL-LION	MANU-FACT-URER	SER-VICE PRO-VIDER	OTHER	FEWER THAN 250	250 TO 999	1000 TO 2499	2500 TO 5000	OVER 5000	CORP-ORATE HEAD QUARTERS MULTI-UNIT ORGANI-ZATION	DIVISION SUB-SIDIARY BRANCH LARGER ORGANI-ZATION	ORGANI-ZATION WITH ALL MAJOR UNITS IN ONE LOCATION
BASE- TOTAL RESPONDENTS	295	160	64	51	100	119	46	139	98	43	8	6	120	93	77
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
NONE	21	7	8	4	8	6	4	6	7	7		1	8	7	6
	7.1	4.4	12.5	7.8	8.0	5.0	8.7	4.3	7.1	16.3		16.7	6.7	7.5	7.8
1	25	13	5	6	5	12	3	8	11	4	1	1	15	6	4
	8.5	8.1	7.8	11.8	5.0	10.1	6.5	5.8	11.2	9.3	12.5	16.7	12.5	6.5	5.2
2	17	10	2	4	5	8	2	6	7	3		1	7	5	5
	5.8	6.3	3.1	7.8	5.0	6.7	4.3	4.3	7.1	7.0		16.7	5.8	5.4	6.5
3	7	2	3	1	1	4	2	3	1	3			5	1	1
	2.4	1.3	4.7	2.0	1.0	3.4	4.3	2.2	1.0	7.0			4.2	1.1	1.3
4	3	2	1			2		1	2				1	1	1
	1.0	1.3	1.6			1.7		.7	2.0				.8	1.1	1.3
5-9	3		1	2		2	1		1		2		3		
	1.0		1.6	3.9		1.7	2.2		1.0		25.0		2.5		
10 OR MORE	2	1	1			2		1	1				2		
	.7	.6	1.6			1.7		.7	1.0				1.7		
NOT REPORTED	217	125	43	34	81	83	34	114	68	26	5	3	79	73	60
	73.6	78.1	67.2	66.7	81.0	69.7	73.9	82.0	69.4	60.5	62.5	50.0	65.8	78.5	77.9
AVERAGE (INCLUDING NONE)	5	2	12	2	1	9	2	2	9	1	4	1	8	1	1
STANDARD DEVIATION	26	3	69	1	1	38		3	42	1	3	1	36	1	1
STANDARD ERROR	2.9	.5	10.8	.3	.2	6.3		.7	7.6	.3	1.7	.5	3.6	.3	.3
AVERAGE (EXCLUDING NONE)	6	2	20	2	2	11	2	3	12	2	4	2	10	2	2
STANDARD DEVIATION	30	3	62	2		41	1	4	47		3		39		
STANDARD ERROR	4.0	.7	17.2	.5		7.6	.6	.9	9.9		1.7		6.9		

Chart 39

STAFFING OF INFORMATION CENTER PROJECTED FOR 1988
* PERSONS, OTHER BACKGROUND *

		ANNUAL SALES			BUSINESS CATEGORY			WORKSITE POPULATION					WORKSITE DESCRIPTION		
	TOTAL	LESS THAN $100 MIL-LION	$100 TO $500 MIL-LION	MORE THAN $500 MIL-LION	MANU-FACT-URER	SER-VICE PRO-VIDER	OTHER	FEWER THAN 250	250 TO 999	1000 TO 2499	2500 TO 5000	OVER 5000	CORP-ORATE HEAD QUARTERS MULTI-UNIT ORGANI-ZATION	DIVISION SUB-SIDIARY BRANCH LARGER ORGANI-ZATION	ORGANI-ZATION WITH ALL MAJOR UNITS IN ONE LOCATION
BASE- TOTAL RESPONDENTS	295	160	64	51	100	119	46	139	98	43	8	6	120	93	77
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
NONE	14	7	4	2	5	5	2	6	4	4			7	3	4
	4.7	4.4	6.3	3.9	5.0	4.2	4.3	4.3	4.1	9.3			5.8	3.2	5.2
1	19	7	3	7	5	7	4	7	7	4		1	7	5	7
	6.4	4.4	4.7	13.7	5.0	5.9	8.7	5.0	7.1	9.3		16.7	5.8	5.4	9.1
2	14	5	6	2	4	8	1	1	6	7			5	4	5
	4.7	3.1	9.4	3.9	4.0	6.7	2.2	.7	6.1	16.3			4.2	4.3	6.5
3	10	4	2	3	2	5	2	4	3	2		1	4	5	1
	3.4	2.5	3.1	5.9	2.0	4.2	4.3	2.9	3.1	4.7		16.7	3.3	5.4	1.3
4	3	2	1		2		1	2		1			3		
	1.0	1.3	1.6		2.0		2.2	1.4		2.3			2.5		
5-9	5	3	1	1		3	1	1	3	1			3	1	1
	1.7	1.9	1.6	2.0		2.5	2.2	.7	3.1	2.3			2.5	1.1	1.3
10 OR MORE	3	1	2			3		1		1	1		2	1	
	1.0	.6	3.1			2.5		.7		2.3	12.5		1.7	1.1	
NOT REPORTED	227	131	45	36	82	88	35	117	75	23	7	4	89	74	59
	76.9	81.9	70.3	70.6	82.0	73.9	76.1	84.2	76.5	53.5	87.5	66.7	74.2	79.6	76.6
AVERAGE (INCLUDING NONE)	2	2	3	2	2	3	2	2	2	2	18	2	3	2	1
STANDARD DEVIATION	3	2	4	1		4	1	2	1	2		1	3	3	1
STANDARD ERROR	.3	.4	1.0	.2		.7	.4	.4	.3	.6		.7	.5	.7	.3
AVERAGE (EXCLUDING NONE)	3	3	4	2	2	4	2	3	2	3	18	2	4	3	2
STANDARD DEVIATION	2	2	4	1	1	3	1	2	2	2		1	3	2	
STANDARD ERROR	.3	.4	1.1	.3	.2	.7	.5	.5	.5	.6		.7	.6	.6	

Chart 40

1988 AMA REPORT ON END-USER COMPUTING

SECTION 4: TRAINING TOOLS/PROVIDERS

TRAINING BUDGET FOR END-USERS IN 1988

		ANNUAL SALES			BUSINESS CATEGORY			WORKSITE POPULATION					WORKSITE DESCRIPTION		
	TOTAL	LESS THAN $100 MILLION	$100 TO $500 MILLION	MORE THAN $500 MILLION	MANUFACTURER	SERVICE PROVIDER	OTHER	FEWER THAN 250	250 TO 999	1000 TO 2499	2500 TO 5000	OVER 5000	CORPORATE HEAD QUARTERS MULTI-UNIT ORGANIZATION	DIVISION SUBSIDIARY BRANCH LARGER ORGANIZATION	ORGANIZATION WITH ALL MAJOR UNITS IN ONE LOCATION
BASE- TOTAL RESPONDENTS	295	160	64	51	100	119	46	139	98	43	8	6	120	93	77
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
$0	47	38	5	2	24	15	7	31	14	2			19	16	12
	15.9	23.8	7.8	3.9	24.0	12.6	15.2	22.3	14.3	4.7			15.8	17.2	15.6
$1,000- $4,999	28	25	1	2	9	11	6	17	5	4	1	1	8	11	9
	9.5	15.6	1.6	3.9	9.0	9.2	13.0	12.2	5.1	9.3	12.5	16.7	6.7	11.8	11.7
$5,000- $9,999	11	6	3	1	5	4	1	7	3	1			5	3	3
	3.7	3.8	4.7	2.0	5.0	3.4	2.2	5.0	3.1	2.3			4.2	3.2	3.9
$10,000- $24,999	31	21	5	3	10	12	5	17	12	2			14	7	10
	10.5	13.1	7.8	5.9	10.0	10.1	10.9	12.2	12.2	4.7			11.7	7.5	13.0
$25,000- $49,999	17	6	7	3	7	6	1	6	9	2			8	6	3
	5.8	3.8	10.9	5.9	7.0	5.0	2.2	4.3	9.2	4.7			6.7	6.5	3.9
$50,000- $99,999	19	5	6	6	5	7	4	5	10	4			11	5	2
	6.4	3.1	9.4	11.8	5.0	5.9	8.7	3.6	10.2	9.3			9.2	5.4	2.6
$100,000- $249,000	11	5	2	4	3	4	3	4	4	1	2		7	2	2
	3.7	3.1	3.1	7.8	3.0	3.4	6.5	2.9	4.1	2.3	25.0		5.8	2.2	2.6
OVER $250,000	10	3	4	2	1	7		2	2	5		1	5	3	2
	3.4	1.9	6.3	3.9	1.0	5.9		1.4	2.0	11.6		16.7	4.2	3.2	2.6
NOT REPORTED	121	51	31	28	36	53	19	50	39	22	5	4	43	40	34
	41.0	31.9	48.4	54.9	36.0	44.5	41.3	36.0	39.8	51.2	62.5	66.7	35.8	43.0	44.2
AVERAGE (IN THOUSANDS OF DOLLARS) (INCLUDING NONE)	56	39	85	91	23	95	32	41	39	151	83	152	69	50	38
STANDARD DEVIATION	163	166	166	154	55	247	50	176	76	240	58	148	195	143	116
STANDARD ERROR	12.3	15.9	28.9	32.2	6.9	30.4	9.6	18.7	9.9	52.5	33.4	104.6	22.2	19.6	17.7
AVERAGE (IN THOUSANDS OF DOLLARS) (EXCLUDING)	76	61	100	99	37	123	44	62	52	167	83	152	92	71	53
STANDARD DEVIATION	187	202	176	159	66	275	53	215	83	247	58	148	220	167	134
STANDARD ERROR	16.5	24.0	33.3	34.8	10.5	38.5	11.9	28.3	12.4	56.8	33.4	104.6	28.9	27.4	24.1

Appendix

Chart 41

1988 AMA REPORT ON END-USER COMPUTING

NUMBER OF INDIVIDUALS WILL BE TRAINED IN 1988 WITH...
* SELF-INSTRUCTION WITH MANUALS OR AUDIO CASSETTES *

SECTION 4: TRAINING TOOLS/PROVIDERS

		ANNUAL SALES			BUSINESS CATEGORY			WORKSITE POPULATION					WORKSITE DESCRIPTION		
	TOTAL	LESS THAN $100 MILLION	$100 TO $500 MILLION	MORE THAN $500 MILLION	MANUFACTURER	SERVICE PROVIDER	OTHER	FEWER THAN 250	250 TO 999	1000 TO 2499	2500 TO 5000	OVER 5000	CORPORATE HEAD QUARTERS MULTI-UNIT ORGANIZATION	DIVISION SUBSIDIARY BRANCH LARGER ORGANIZATION	ORGANIZATION WITH ALL MAJOR UNITS IN ONE LOCATION
BASE- TOTAL RESPONDENTS	295	160	64	51	100	119	46	139	98	43	8	6	120	93	77
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
NONE	23	16	3	4	9	7	3	16	4	2			8	5	9
	7.8	10.0	4.7	7.8	9.0	5.9	6.5	11.5	4.1	4.7			6.7	5.4	11.7
1-2	9	5		3	4	1	3	6	1	2			2	3	4
	3.1	3.1		5.9	4.0	.8	6.5	4.3	1.0	4.7			1.7	3.2	5.2
3-5	28	19	4	5	15	9	3	13	9	4		2	10	7	11
	9.5	11.9	6.3	9.8	15.0	7.6	6.5	9.4	9.2	9.3		33.3	8.3	7.5	14.3
6-9	5	3	1		1	1	2	4	1				1	2	2
	1.7	1.9	1.6		1.0	.8	4.3	2.9	1.0				.8	2.2	2.6
10-19	15	9	2	3	8	3	2	8	5	1	1		9	3	2
	5.1	5.6	3.1	5.9	8.0	2.5	4.3	5.8	5.1	2.3	12.5		7.5	3.2	2.6
20-49	34	16	11	6	8	19	5	12	13	8	1		9	15	10
	11.5	10.0	17.2	11.8	8.0	16.0	10.9	8.6	13.3	18.6	12.5		7.5	16.1	13.0
50 OR MORE	32	11	10	11	4	18	7	11	12	6	2	1	16	12	3
	10.8	6.9	15.6	21.6	4.0	15.1	15.2	7.9	12.2	14.0	25.0	16.7	13.3	12.9	3.9
NOT REPORTED	149	81	33	19	51	61	21	69	53	20	4	3	65	46	36
	50.5	50.6	51.6	37.3	51.0	51.3	45.7	49.6	54.1	46.5	50.0	50.0	54.2	49.5	46.8
AVERAGE (INCLUDING NONE)	49	19	63	113	35	73	35	22	47	79	283	169	53	70	18
STANDARD DEVIATION	134	29	100	253	109	181	55	37	96	202	414	234	138	175	40
STANDARD ERROR	11.1	3.2	18.0	44.7	15.6	23.8	11.1	4.4	14.3	42.1	207.2	135.1	18.6	25.6	6.2
AVERAGE (EXCLUDING NONE)	58	24	70	130	43	83	40	29	52	87	283	169	62	79	23
STANDARD DEVIATION	144	30	103	266	119	191	57	39	99	209	414	234	147	184	44
STANDARD ERROR	13.0	3.8	19.5	50.3	18.9	26.8	12.2	5.4	15.5	45.7	207.2	135.1	21.5	28.4	7.8

Chart 42

1988 AMA REPORT ON END-USER
COMPUTING

SECTION 4: TRAINING TOOLS/PROVIDERS

NUMBER OF INDIVIDUALS WILL BE TRAINED IN 1988 WITH...
* SELF-INSTRUCTION WITH COMPUTER BASED TRAINING MATERIALS *

		ANNUAL SALES			BUSINESS CATEGORY			WORKSITE POPULATION					WORKSITE DESCRIPTION		
	TOTAL	LESS THAN $100 MILLION	$100 TO $500 MILLION	MORE THAN $500 MILLION	MANUFACTURER	SERVICE PROVIDER	OTHER	FEWER THAN 250	250 TO 999	1000 TO 2499	2500 TO 5000	OVER 5000	CORPORATE HEAD QUARTERS MULTI-UNIT ORGANIZATION	DIVISION SUBSIDIARY BRANCH LARGER ORGANIZATION	ORGANIZATION WITH ALL MAJOR UNITS IN ONE LOCATION
BASE- TOTAL RESPONDENTS	295	160	64	51	100	119	46	139	98	43	8	6	120	93	77
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
NONE	31	22	6	3	12	11	5	19	9	2		1	10	7	14
	10.5	13.8	9.4	5.9	12.0	9.2	10.9	13.7	9.2	4.7		16.7	8.3	7.5	18.2
1-2	14	6	2	4	6	2	5	10	2	1		1	6	5	3
	4.7	3.8	3.1	7.8	6.0	1.7	10.9	7.2	2.0	2.3		16.7	5.0	5.4	3.9
3-5	13	12		1	10	3		7	4	1	1		6	4	3
	4.4	7.5		2.0	10.0	2.5		5.0	4.1	2.3	12.5		5.0	4.3	3.9
6-9	5	3	1	1	1	2	2	3	2				2	2	1
	1.7	1.9	1.6	2.0	1.0	1.7	4.3	2.2	2.0				1.7	2.2	1.3
10-19	20	10	4	2	5	9	3	13	4	3			8	3	8
	6.8	6.3	6.3	3.9	5.0	7.6	6.5	9.4	4.1	7.0			6.7	3.2	10.4
20-49	31	17	7	6	8	17	4	13	12	5	1		12	11	8
	10.5	10.6	10.9	11.8	8.0	14.3	8.7	9.4	12.2	11.6	12.5		10.0	11.8	10.4
50 OR MORE	34	8	13	13	8	20	3	7	10	14	2	1	17	11	6
	11.5	5.0	20.3	25.5	8.0	16.8	6.5	5.0	10.2	32.6	25.0	16.7	14.2	11.8	7.8
NOT REPORTED	147	82	31	21	50	55	24	67	55	17	4	3	59	50	34
	49.8	51.3	48.4	41.2	50.0	46.2	52.2	48.2	56.1	39.5	50.0	50.0	49.2	53.8	44.2
AVERAGE (INCLUDING NONE)	41	15	79	74	27	61	18	17	39	102	73	67	49	31	42
STANDARD DEVIATION	101	22	173	107	75	132	33	32	82	192	75	94	86	41	150
STANDARD ERROR	8.3	2.5	30.2	19.6	10.6	16.5	7.0	3.7	12.5	37.7	37.7	54.3	11.0	6.3	23.0
AVERAGE (EXCLUDING NONE)	52	22	97	82	36	73	24	24	50	111	73	101	58	37	62
STANDARD DEVIATION	111	22	187	110	84	142	35	35	89	197	75	99	91	42	180
STANDARD ERROR	10.3	3.0	36.0	21.3	13.6	19.6	8.6	4.8	15.2	40.4	37.7	70.0	12.8	7.1	33.5

Chart 43

1988 AMA REPORT ON END-USER COMPUTING

NUMBER OF INDIVIDUALS WILL BE TRAINED IN 1988 WITH...
* CLASSROOM INSTRUCTION *

SECTION 4: TRAINING TOOLS/PROVIDERS

		ANNUAL SALES			BUSINESS CATEGORY			WORKSITE POPULATION					WORKSITE DESCRIPTION		
	TOTAL	LESS THAN $100 MIL-LION	$100 TO $500 MIL-LION	MORE THAN $500 MIL-LION	MANU-FACT-URER	SER-VICE PRO-VIDER	OTHER	FEWER THAN 250	250 TO 999	1000 TO 2499	2500 TO 5000	OVER 5000	CORP-ORATE HEAD QUARTERS MULTI-UNIT ORGANI-ZATION	DIVISION SUB-SIDIARY BRANCH LARGER ORGANI-ZATION	ORGANI-ZATION WITH ALL MAJOR UNITS IN ONE LOCATION
BASE- TOTAL RESPONDENTS	295	160	64	51	100	119	46	139	98	43	8	6	120	93	77
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
NONE	20	17	2	1	7	7	4	15	4		1		6	3	11
	6.8	10.6	3.1	2.0	7.0	5.9	8.7	10.8	4.1		12.5		5.0	3.2	14.3
1-2	14	12	2		4	6	3	8	3	3			4	4	6
	4.7	7.5	3.1		4.0	5.0	6.5	5.8	3.1	7.0			3.3	4.3	7.8
3-5	13	11	1	1	6	4	3	10	2		1		6	3	4
	4.4	6.9	1.6	2.0	6.0	3.4	6.5	7.2	2.0		12.5		5.0	3.2	5.2
6-9	8	7		1	6	2		5	3				2	4	2
	2.7	4.4		2.0	6.0	1.7		3.6	3.1				1.7	4.3	2.6
10-19	27	13	4	6	12	8	4	18	7	1		1	11	10	6
	9.2	8.1	6.3	11.8	12.0	6.7	8.7	12.9	7.1	2.3		16.7	9.2	10.8	7.8
20-49	27	14	7	5	7	10	6	13	9	5			11	12	4
	9.2	8.8	10.9	9.8	7.0	8.4	13.0	9.4	9.2	11.6			9.2	12.9	5.2
50 OR MORE	80	22	30	25	18	42	12	19	33	23	3	2	41	20	17
	27.1	13.8	46.9	49.0	18.0	35.3	26.1	13.7	33.7	55.5	37.5	33.3	34.2	21.5	22.1
NOT REPORTED	106	64	18	12	40	40	14	51	37	11	3	3	39	37	27
	35.9	40.0	28.1	23.5	40.0	33.6	30.4	36.7	37.8	25.6	37.5	50.0	32.5	39.8	35.1
AVERAGE (INCLUDING NONE)	117	34	190	246	78	163	74	39	131	230	431	338	157	95	77
STANDARD DEVIATION	213	68	262	294	187	250	123	103	195	262	467	398	250	181	170
STANDARD ERROR	15.5	6.9	38.7	47.1	24.2	28.2	21.9	11.0	24.9	46.4	209.1	230.3	27.8	24.2	24.1
AVERAGE (EXCLUDING NONE)	130	42	199	252	88	178	84	48	141	230	538	338	170	100	99
STANDARD DEVIATION	222	72	265	296	197	257	129	111	198	262	464	398	255	185	187
STANDARD ERROR	17.0	8.1	40.0	48.0	27.1	30.3	24.4	13.0	26.2	46.4	232.4	230.3	29.5	25.4	30.0

Chart 44

1988 AMA REPORT ON END-USER COMPUTING

SECTION 4: TRAINING TOOLS/PROVIDERS

AGENCIES HAVING ORGANIZATIONAL RESPONSIBILITY FOR COMPUTER TRAINING

		ANNUAL SALES			BUSINESS CATEGORY			WORKSITE POPULATION					WORKSITE DESCRIPTION		
	TOTAL	LESS THAN $100 MILLION	$100 TO $500 MILLION	MORE THAN $500 MILLION	MANUFACTURER	SERVICE PROVIDER	OTHER	FEWER THAN 250	250 TO 999	1000 TO 2499	2500 TO 5000	OVER 5000	CORPORATE HEAD QUARTERS MULTI-UNIT ORGANIZATION	DIVISION SUBSIDIARY BRANCH LARGER ORGANIZATION	ORGANIZATION WITH ALL MAJOR UNITS IN ONE LOCATION
BASE- TOTAL RESPONDENTS	295	160	64	51	100	119	46	139	98	43	8	6	120	93	77
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MIS/DP DEPARTMENT	204	111	45	34	68	82	33	92	68	31	8	4	90	58	52
	69.2	69.4	70.3	66.7	68.0	68.9	71.7	66.2	69.4	72.1	100.0	66.7	75.0	62.4	67.5
HUMAN RESOURCES DEPARTMENT	39	13	8	14	10	14	7	7	17	9	2	4	13	17	8
	13.2	8.1	12.5	27.5	10.0	11.8	15.2	5.0	17.3	20.9	25.0	66.7	10.8	18.3	10.4
END-USER DEPARTMENT	100	52	20	19	35	42	12	41	34	16	4	4	34	38	25
	33.9	32.5	31.3	37.3	35.0	35.3	26.1	29.5	34.7	37.2	50.0	66.7	28.3	40.9	32.5
INFORMATION CENTER OR OTHER END USER ASSISTANCE UNIT	72	17	21	29	20	33	9	18	28	17	6	3	37	20	14
	24.4	10.6	32.8	56.9	20.0	27.7	19.6	12.9	28.6	39.5	75.0	50.0	30.8	21.5	18.2
OTHER	21	11	6	4	2	8	10	9	9	2	1		6	10	5
	7.1	6.9	9.4	7.8	2.0	6.7	21.7	6.5	9.2	4.7	12.5		5.0	10.8	6.5
NO ASSIGNED RESPONSIBILITY	20	15	4	1	11	9		11	8	1			7	8	5
	6.8	9.4	6.3	2.0	11.0	7.6		7.9	8.2	2.3			5.8	8.6	6.5
NOT REPORTED	19	14	3		5	6	5	15	3	1			5	4	9
	6.4	8.8	4.7		5.0	5.0	10.9	10.8	3.1	2.3			4.2	4.3	11.7

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